SECRET RAVINE

A. Water Quality Data

1. 2001 and Periodic Water Quality Sampling, Central Valley Regional Water Quality Control Board: Periodic water quality information has been collected for three sites in the Secret Ravine Watershed. From December 2000 through February 2002, the Central Valley Regional Water Quality Control Board (Regional Board) staff conducted approximately monthly monitoring at Loomis Basin Park. The Regional Board collections also included pesticide scans with no problems noted. Water quality standards for selected metals (Table 1) indicate that standards for cadmium, copper, and zinc were exceeded in at least one sample (Table 2). One hardness measurement was taken at the time of sampling, but contemporary measurements indicate that hardness must have been near 50 mg/l for the other samples. Data on hardness in the stream over the course of the one-year of monthly monitoring ranged from 32-76 mg/l that demonstrate that the water quality standards at a hardness of 50 mg/l are applicable.

In addition, the fluctuations in pH values recorded by Regional Board sampling are also a concern. While the total magnitude of the annual change is not as great as recorded in other drainages, it is the rapidity at which the changes are taking place, particularly in the fall. This is the same pattern noted in adjacent streams and watersheds. Figure 1 displays the pH data from the Regional Board sampling at Loomis Basin Park. While the absolute values are within the accepted range for coldwater fish species, the fluctuations are quite high and additional sampling would help clarify the overall situation. **Source: Central Valley Regional Water Quality Control Board, unpublished data:**

Table 1. California Toxics Rule water quality standards for selected metals, based on a hardness of 50 mg/l as CaCO3.

Metal	Maximum Concentration (Acute) (mg/l)	Continuous Concentration (Chronic) (mg/l)
Barium	No standard	No standard
Cadmium	0.002	0.0013
Copper	0.007	0.005
Zinc	0.067	0.066

Source: California Toxics Rule (water quality objectives).

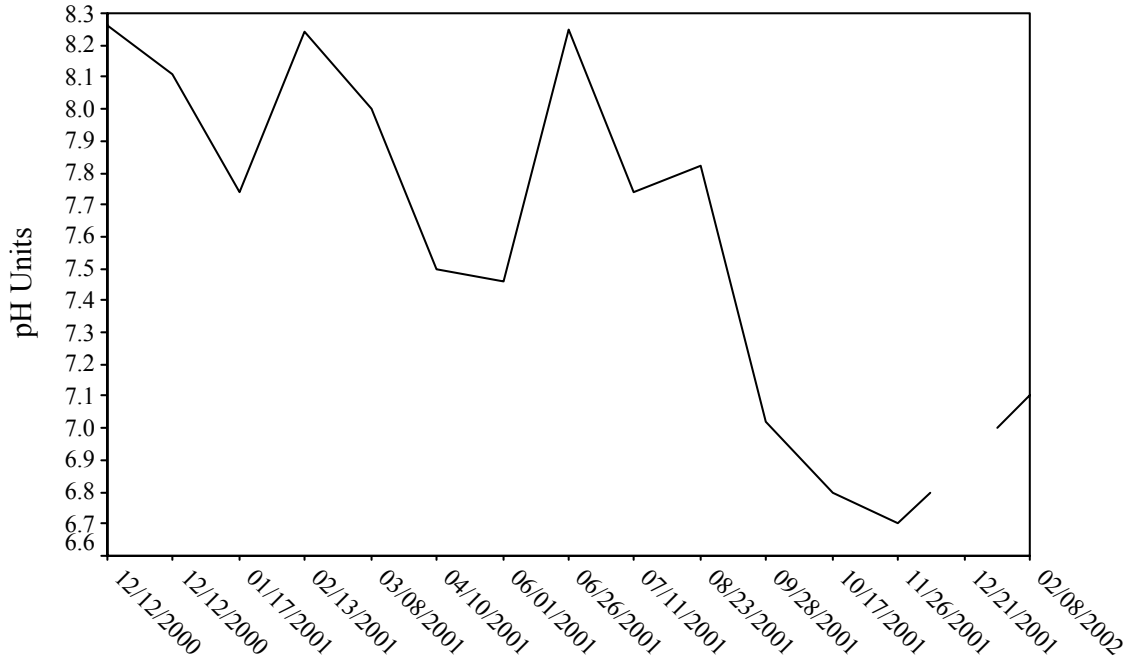
Table 2. Metal concentration data from two locations in Secret Ravine. This data shows that cadmium, copper, and zinc concentrations exceed the California Toxics Rules standards calculated for a hardness of 50 mg/l as CaCO3. **Values in bold exceed California Toxics Rule objectives for aquatic life at a hardness of 50 mg/l**.

Stream	Location	Date	Cadmium mg/l	Copper mg/l	Zinc mg/l	Notes
Secret Ravine	Secret Ravine above Rocklin Road	11/13/01	0.000	**0.005**	0.012	Hardness ≈ 32-76 mg/l
Secret	Secret Ravine at	11/13/01	0.000	**0.005**	0.015	Hardness ≈

Ravine	Miners Ravine					32-76 mg/l
Secret Ravine	Secret Ravine at Miners Ravine	11/08/02	**0.010**	**0.012**	**0.070**	Hardness = 47 mg/l

Source: Central Valley Regional Water Quality Control Board, unpublished data:

Figure 1. Monthly time series of pH data taken in Secret Ravine at Loomis Basin Park during the period December 2000 to February 2002.



2. Dry Creek Conservancy Sampling. The Dry Creek Conservancy (DCC) has conducted periodic "first flush" and/or quarterly monitoring upstream of Rocklin Road, and at the confluence with Miners Ravine. A variety of parameters are collected, but the data are not comprehensive or systematic for all parameters. The DCC data raise a concern about the ratio of nitrate to orthophosphate in the stream. Data from DCC sampling near Rocklin Road (Figure 2) and at the confluence with Miners Ravine (Figure 3) show the ratios are not consistent with the recommended 10:1 nitrate to orthophosphate. While the concentrations shown are not excessive, these data are quarterly and do not necessarily reflect the actual levels over the full year time period. Also, there is no comparable dissolved oxygen data to indicate if there are declines in dissolved oxygen levels during the night during summer and fall. It appears that phosphorus is not a limiting nutrient at this time and that additional inputs of nitrates from runoff and lawn fertilizers could create biostimulation and declines in dissolved oxygen levels. Additional sampling to clarify the situation should be a high priority. A complete set of all water quality data is available electronically from the DCC, while Bailey Environmental has a complete copy of the provisional data. **Source: Dry Creek Conservancy, unpublished data.**

Figure 2. Comparison of nitrate (NO3) and orthophosphate (PO4) concentrations from quarterly sampling near Rocklin Road.

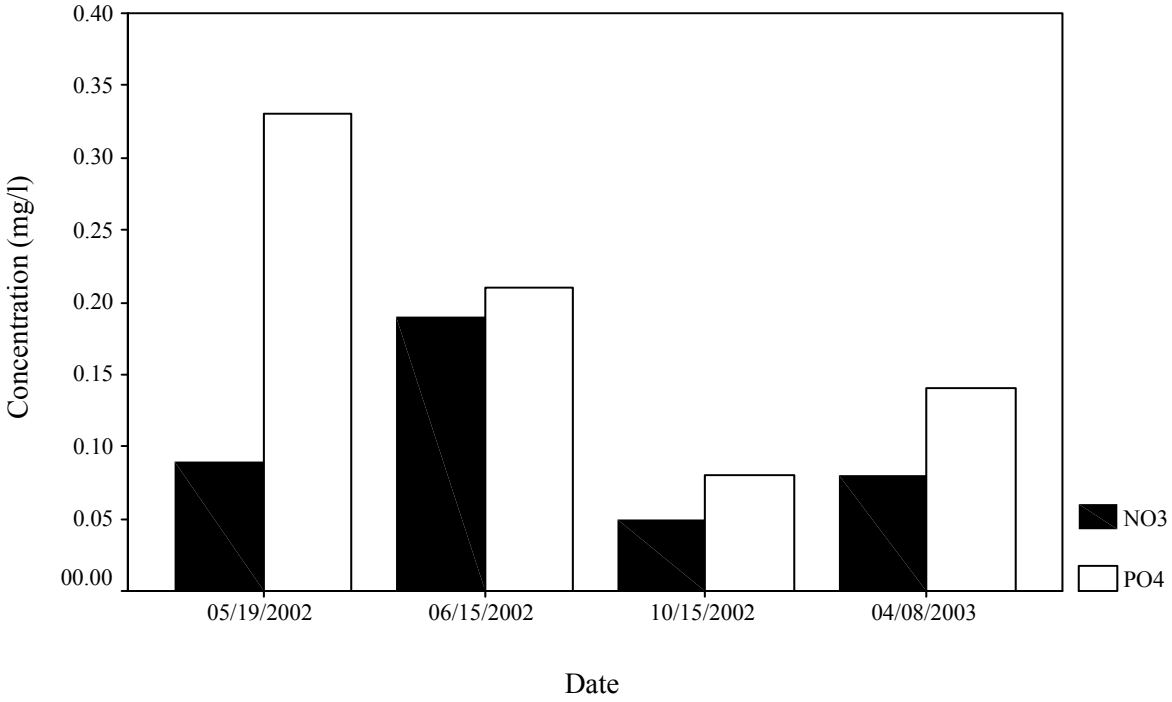
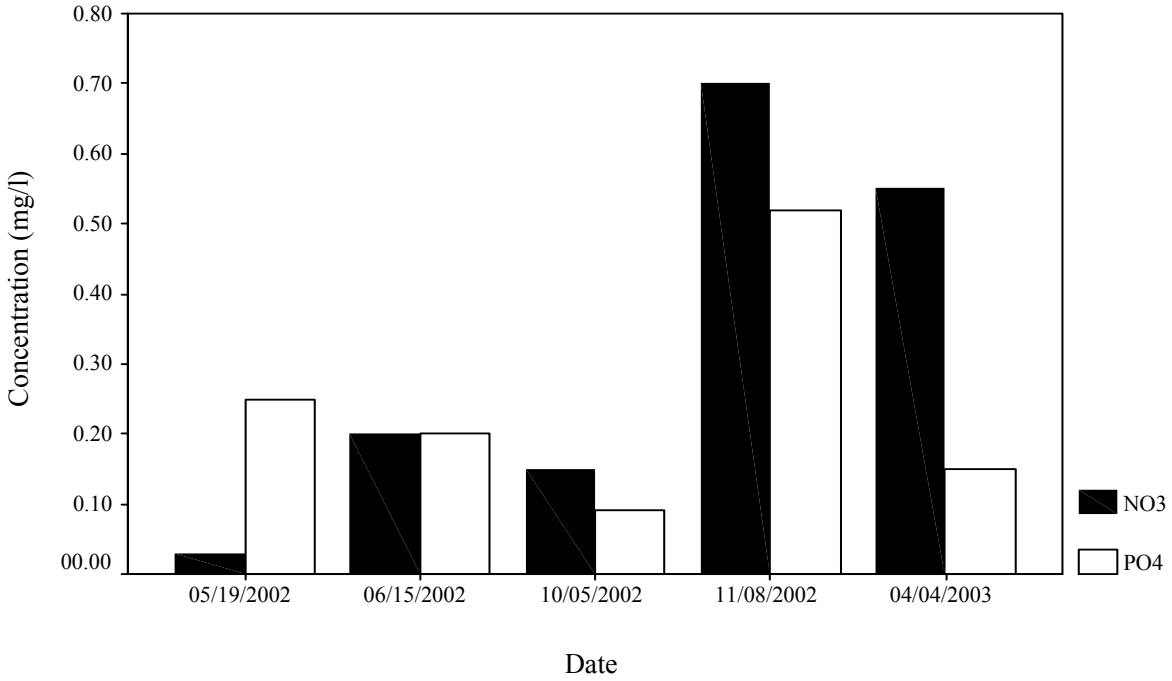


Figure 3. Comparison of nitrate (NO3) and orthophosphate (PO4) concentrations from quarterly sampling near the confluence with Miners Ravine.



B. Water Temperature Data

Water temperature data is limited, with the majority of the data coming from hourly monitoring funded by Placer County and conducted by Bailey Environmental. This sampling was initiated in late May 2003 and will continue for approximately one year. All data retrieved to date is plotted in Figures 3-6 below. Since daily maximum, minimum, and/or mean temperatures individually are of little value, I have chosen to plot all data points. Therefore, I have split the year into time periods that roughly correspond to:

Fall-early winter: September though December; primary fall-run chinook salmon spawning period is November-December.
Winter-spring: January though April; fall-run chinook salmon incubation and rearing and steelhead spawning, incubation, and rearing.
Late spring-summer: May to September; summer rearing for steelhead juveniles.

Data plots for these time periods are presented below to allow the reader to assess the potential of Miners Ravine to support chinook salmon and/or steelhead trout spawning and rearing. A variety of localized data and literature was reviewed to establish a generalized understanding of the potential for temperature effects on various life history stages for both chinook salmon and steelhead trout. There is fairly substantial variation in temperature effects noted for most life history stages. However, both chinook salmon and steelhead are have a highly adaptable physiology and ability to seek thermal refuge during part of the day which allows them to tolerate and/or avoid lethal temperatures. Some of the literature sources cite criteria from others and some of the data is based on fish captures with water temperature taken concurrently. Two tables with data and reference are included in Appendix A of this report. Based on this review, the following criteria have been used to indicate what life history stages a particular stream may support at any given time:

Chinook Salmon	**^{O}C**	**Steelhead Trout**	**^{O}C**
Egg and fry development	14.4 (58 ^{O}F)	Egg and fry development	14.4 (58 ^{O}F)
Juvenile rearing	21.1 (70 ^{O}F)	Juvenile rearing	22.2 (72 ^{O}F)
Adult migration	21.7 (71 ^{O}F)	Adult migration and holding	22.2 (72 ^{O}F)

Accordingly, reference lines at 14.4 ^{O}C and 22.2 ^{O}C have been plotted on Figures 4-9 to roughly represent the water temperatures suitable for salmonid spawning migration, egg and fry development, and juvenile rearing.

1. Rocklin and Brace Roads Juvenile Trapping Survey February 29 – May 24, 1984: Table 3 displays water temperature data from a short-term juvenile chinook salmon trapping program on Secret Ravine. **Source: Unsigned, unidentifiable author note in CDFG, Region 2 files.**

Table 3. Water temperature measurements from two fish sampling locations on Secret Ravine during the spring of 1984.

Date	Time	Water Temp. (^{O}F)	Location
2/29/84	1230	50	Rocklin Rd.
3/6/84	---	63.5	Rocklin Rd.
5/2/84	0900	55	Rocklin Rd.
5/24/84	1000	64	Rocklin Rd.
2/29/84	1200	50	Brace Rd.
5/2/84	---	55	Brace Rd.

Source: Unsigned, unidentifiable author note in CDFG, Region 2 files.

2. 1998-2003 Sampling in Miners Ravine by Rob Titus, California Department of Fish and Game: Titus' memorandum presents information on daily maximum and average water temperatures at more than one location in Miners Ravine over the period June 1, 1999 though August 31, 1999. He indicates that water temperatures spiked at 77 ^{O}F on three occasions in July 1999 and averaged 70 ^{O}F over the three-month period. I was able to obtain detailed data from Titus for their site at Gilardi Road near Newcastle for the period July 30, 2002 through August 27, 2003 and that data is displayed (2hour sampling intervals) in Figures 4-7 below. However, Titus has indicated that he has other detailed data for earlier years, but will not have time to supply the information until mid-December 2003. I have asked him to provide the data to me and I will in turn provide the data to Placer County. **Source: Memorandum from CDFG Biologist Rob Titus dated November 5, 2001, CDFG, Region 2 files; Unpublished data from Titus for 2002-2003.**

3. Water Temperature Information from Bailey Environmental, May to August 2003: In May 2003, Placer County contracted to add additional stations on Secret Ravine. Stations were added at Loomis Basin Park, AMPM Minimart near Rocklin Road, and at the Olympus Point development in Roseville behind the United Artists theatre complex. Figures 8 and 9 display all of the data to date. Data from the Olympus Point station is missing due to theft of the temperature sensor. All of the data for all of the stations has been delivered to the County in electronic format. Bailey Environmental has all data in its statistics package and can generate most any type of analysis on short notice. **Source: Bailey Environmental, unpublished data.**

Figure 4. Water temperature time series for Secret Ravine at Gilardi Road for the period July 30 through August 31, 2002. Temperatures are suitable for juvenile rearing.

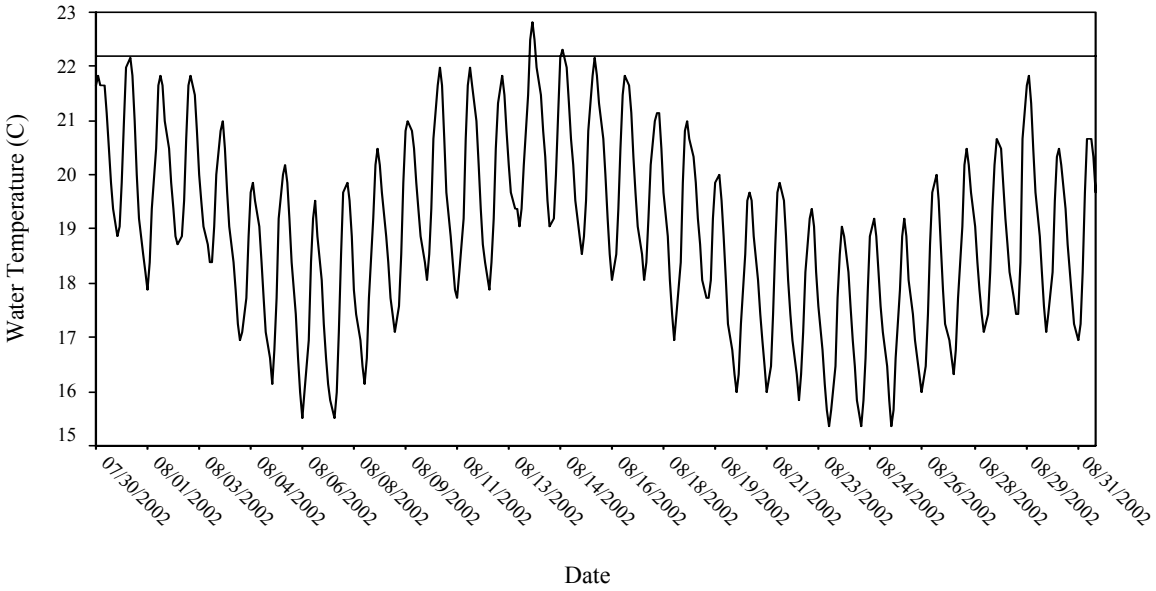


Figure 5. Water temperature time series for Secret Ravine at Gilardi Road for the period September 1 through December 31, 2002. Temperatures are suitable for juvenile rearing or adult spawning.

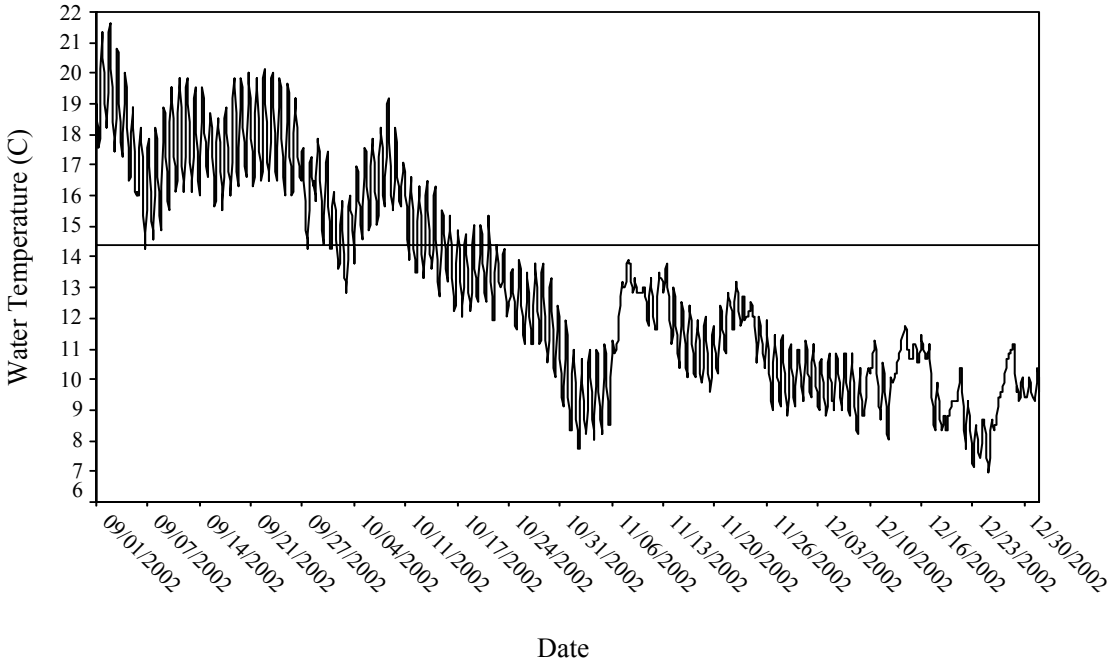


Figure 6. Water temperature time series for Secret Ravine at Gilardi Road for the period January1 through April 30, 2003. Temperatures are suitable for juvenile rearing or adult spawning.

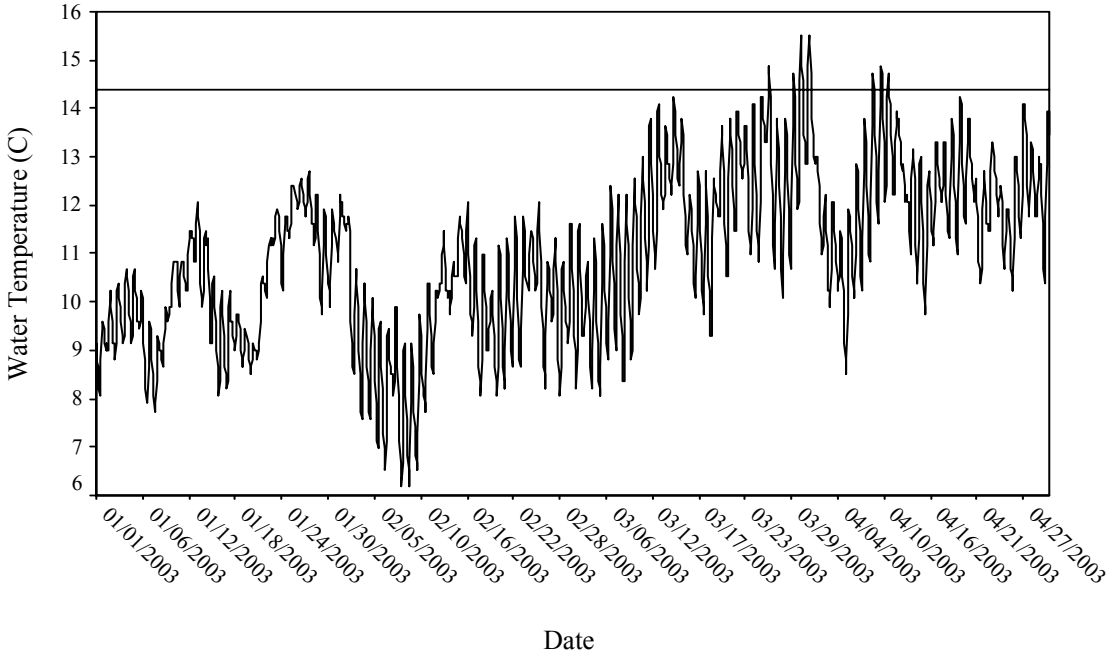


Figure 7. Water temperature time series for Secret Ravine at Gilardi Road for the period May 1 through August 31, 2003. Temperatures are suitable for juvenile rearing.

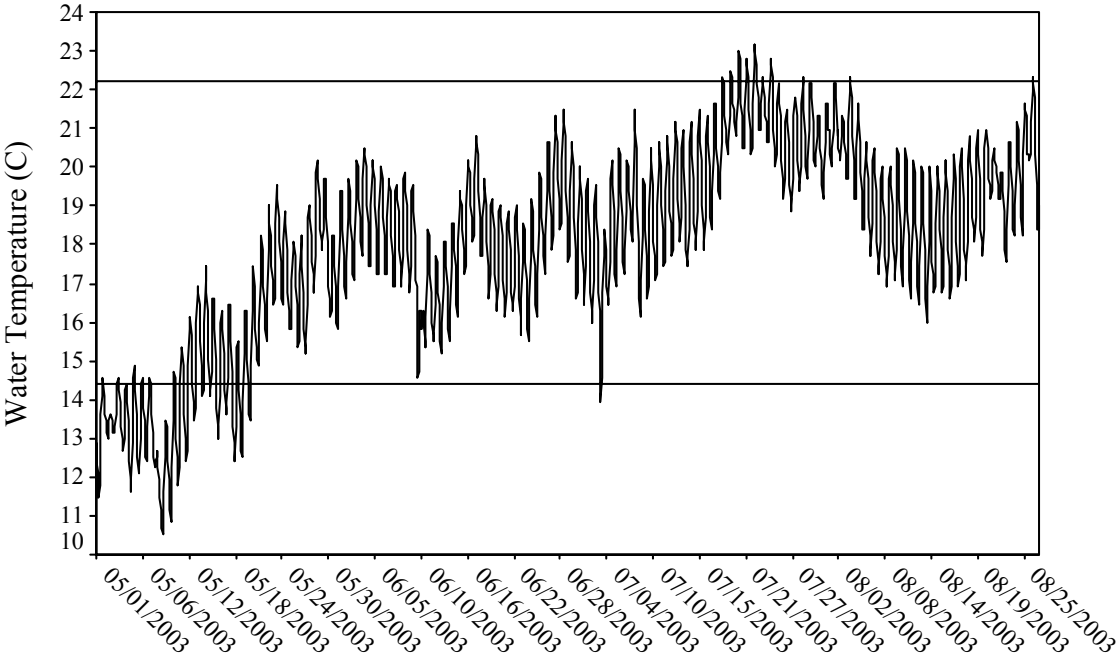


Figure 8. Water temperature time series for Secret Ravine at Loomis Basin Park for the period May 29 through August 5, 2003. Temperatures are suitable for juvenile rearing.

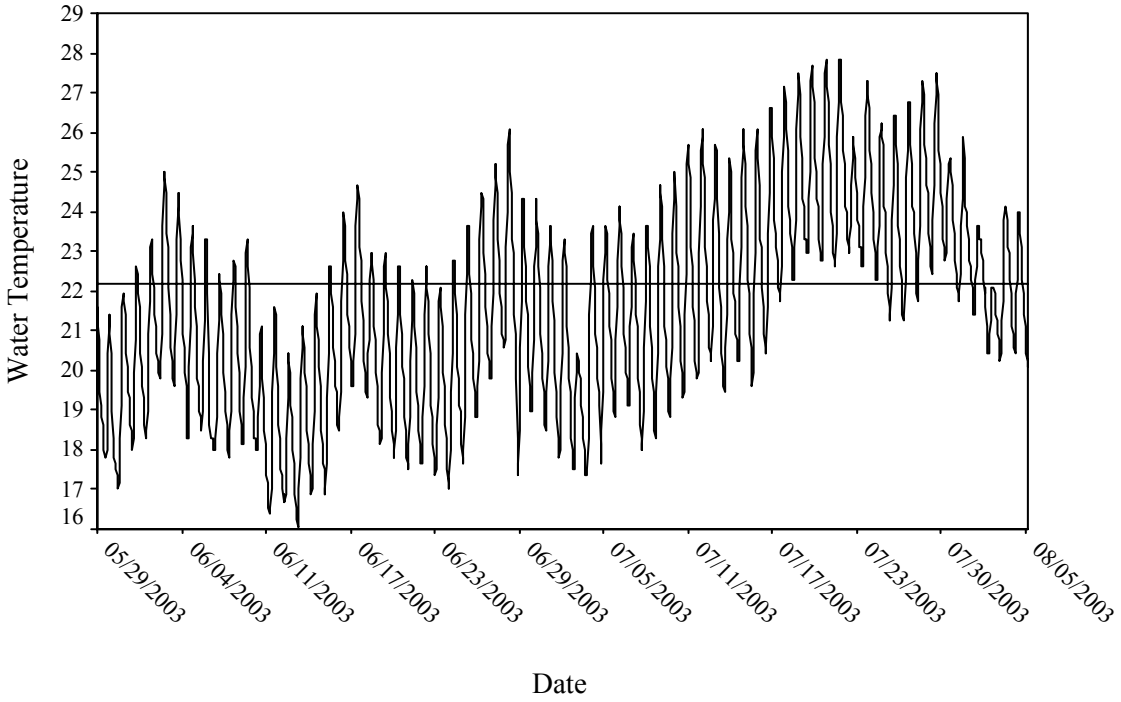
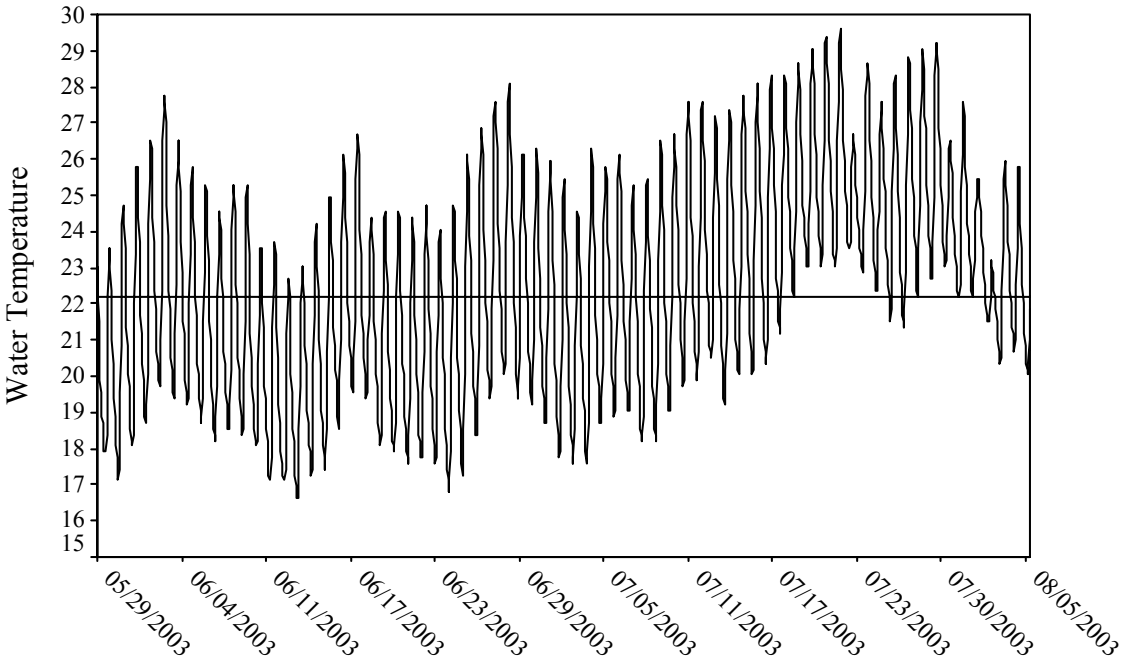


Figure 9. Water temperature time series for Secret Ravine at the AMPM Minimart near Rocklin Road for the period May 29 through August 5, 2003. Temperatures are suitable to marginal for juvenile rearing.



C. Benthic Invertebrate Data

1. Wayne C. Fields, 1999. Fields collected samples from six locations in Secret Ravine during September of 1999 (corresponding to specific habitat units identified in the physical habitat inventory conducted by Stacy Li and Fields in the spring of 1999). Fields' sampling locations and general characteristics of the riffle's quality is presented in Table 4 (All data is presented in Appendix Secret Ravine 1). Fields attempted to rate each riffle's habitat quality, based on visual observation, prior to conducting the sampling. Analysis of the data indicates that 5 of the 6 locations did not have significantly different benthic invertebrate species composition and population levels, even though the visual observations indicated otherwise. Habitat units 93 and 97 were dissimilar, but Fields indicates that off road vehicle traffic through the stream may have influenced the results. He also concludes that Secret Ravine's benthic invertebrate population characteristics are indicative of a stream suffering from higher water temperatures and organic pollution. **Source: The Benthic Macroinvertebrate Fauna of Secret Ravine Creek, Placer County, California by Wayne C. Fields, 1999.**

Table 4. Description of riffles sampled for benthic macroinvertebrates during September 1999 by Wayne Fields in Secret Ravine.

Habitat Unit	Location	Habitat Quality	Type of Riffle
3	Upstream of Miners Ravine	Good	Low Gradient
5	Upstream of Miners Ravine	Fair	Low Gradient
93	Meadow, West End of China Garden Rd.	Good	Low Gradient
97	Meadow, West End of China Garden Rd.	Poor	Low Gradient
251	Downstream of Dominguez Road	Fair	Low Gradient
253	Downstream of Dominguez Road	Good	Low Gradient
318	Behind Sierra College	Fair	Medium Gradient
322	Behind Sierra College	Excellent	Medium Gradient
492	Below Horseshoe Bar Road	Excellent	Medium Gradient
505	Above Horseshoe Bar Road	Fair	Medium Gradient
618	Loomis Basin Park	Fair	Low Gradient
629	Loomis Basin Park	Excellent	Low Gradient

Source: The Benthic Macroinvertebrate Fauna of Secret Ravine Creek, Placer County, California by Wayne C. Fields, 1999.

2. Dry Creek Conservancy. Members of the Dry Creek Conservancy conduct the sampling program for benthic macroinvertebrates. Sampling data from 2000 (at a single, unidentified site and a single sample from a site identified as "Secret Ravine Gravel Site") and two sampling sites in 2001 (Sierra College, not identified as the College or Blvd., and near the confluence with Miners Ravine) are presented in Appendix Secret Ravine 1. These data indicate a high percentage of pollution tolerant organisms, with almost no taxa associated with cleaner waters. These results are not unexpected given the urban nature of the stream and the amount of sediment deposited in the channel. **Source: Dry Creek Conservancy, unpublished data.**

D. Physical Habitat Data

Physical habitat data consists of a single detailed study and several partial evaluations for Secret Ravine:

1. 1963 and 1964 Spawning Gravel Survey by Eric Gerstung: Gerstung conducted spawning gravel surveys in Secret Ravine in conjunction with his chinook salmon spawning surveys in these two years. He described the stream as follows:

1. Water cool during the summer
2. Pools frequent and deep
3. Riffles short and consist of quartz gravel
4. Granite sand covers bottom of slow velocity sections
5. Spawning gravel capacity to support 1,000 adult spawners

Source: June 3, 1965 Memorandum, by Eric Gerstung, entitled "THE FISH AND WILDLIFE RESOURCES OF THE SECRET RAVINE CREEK AREA OF PLACER COUNTY AND RECOMMENDATION FOR THEIR PROTECTION"; CDFG, Region 2 files.

2. 1992-1993 Habitat Inventory by David Vanicek, Professor at California State University, Sacramento: The habitat inventory was limited to one reach. Vanicek describes this 2300 m reach as follows:

> "Reach SR: Reach runs from the confluence with Miners Ravine upstream 2300 m to the city limit. Description: Diversity of flatwater, riffles, and pools (including several 1st class pools); rubble and gravel comprise about 40% of substrate; several spawning sites; considerable canopy; good cover provide by logs, pools, and overhanging vegetation; possible barriers at low flow: old concrete dam near Miners Ravine confluence, and shallow riffle beneath [Roseville] Parkway Bridge; overall quality: 5."

Vanicek defines flatwater as the same as would be considered a glide in most other methodologies. In his scheme, a "1st class pool" is large and deep with more than 30% of the stream bottom obscured, etc., or a maximum depth of > 1.5m. **Source: Fisheries Habitat Evaluation Dry Creek, Antelope Creek, Secret Ravine, and Miners Ravine (Task I); Prepared for EIP Associates by C. David Vanicek, CSUS Hornet Foundation, August 1993, Copy from CDFG files, Region 2.**

3. 1997 Spawning Gravel Survey by John Nelson, Department of Fish and Game: Nelson surveyed the stream from the confluence with Miners Ravine to approximately 1.5 miles upstream in 1997. He visually estimated the amount of spawning gravel 2-13 cm in diameter (3/4–5") and percentage of embeddedness. His conclusion was that embeddedness was >20% ad that at least 600 fish could be accommodated. He also recommended spawning substrate restoration because of the amount of sand in the spawning riffles. **Source: 9/27/97 Memorandum from John Nelson, CDFG, Region 2 files.**

4. 1999 Steam Habitat Assessment by Stacy Li and Wayne Fields for the Dry Creek Conservancy: This survey was completed between February and June 1999 and covered the stream length from the confluence with Miners Ravine upstream to Rock Springs Road (10.0 miles). Measurements for a variety of variable were recorded (Table 5) and analysis of 24 variables (21 by cumulative percentage and 3 by percentage only) is included in the report. Seven habitat types were identified with four (Table 6) dominating the habitat typing. The dominant substrate recorded was sand and covered 70.71% of the stream bottom in the length of stream surveyed. **Source: Existing Conditions Report entitled *Assessments of Stream Habitat in Secret Ravine, Placer County, California, Spring, 1999,* by Stacy Li and Wayne Fields, prepared for the Dry Creek Conservancy.**

Table 5. List of parameters recorded in the Li and Fields habitat assessment for Secret Ravine in the spring of 1999.

Parameters Recorded	Parameters Recorded	Parameters Recorded
Date Sampled	Rearing Habitat Quality Ranking	Quality of Spawning Gravel Ranking
Habitat Unit Number	Rearing Habitat Quality Constraints Ranking	Quality of Spawning Gravel Constraints Ranking
Habitat Type	Instream Cover	Cover (along bank)
Pool Type	Area of Benthos Habitat (gravel riffle) (sq. ft.)	Maximum Pool Depth (ft)
Cumulative Length to Habitat Unit Downstream End (ft)	Quality of Benthos Habitat Ranking	Water Depth at Pool Tail Crest (ft)
Cumulative Length to Habitat Unit Upstream End (ft)	Substrate Texture	Dominant Substrate Ranking
Mean Channel Width (ft)	Gravel Embeddedness	Channel Cross Section Symmetry
Surface Water Velocity Rating	Depth of Embeddedness	Channel Shape
Typical (mode) Water Depth (ft.)	Number Shear	Parallel Flow
Water Surface Turbulence Rating		

Source: Existing Conditions Report entitled *Assessments of Stream Habitat in Secret Ravine, Placer County, California, Spring, 1999,* by Stacy Li and Wayne Fields, prepared for the Dry Creek Conservancy.

Table 6. Distribution of major habitat types by cumulative frequency, cumulative length, and cumulative area in Secret Ravine during the spring of 1999. Other habitat types comprised less than 2% each.

Habitat Type	Frequency (%)	Rank	Length (%)	Rank	Area (%)	Rank
Run	42.9	1	52.89	1	49.94	1
Glide	13.9	4	17.80	2	20.77	2
Pool	17.14	3	16.00	3	18.10	3
Riffle	20.23	2	10.98	4	9.23	4

Source: Existing Conditions Report entitled *Assessments of Stream Habitat in Secret Ravine, Placer County, California, Spring, 1999*, by Stacy Li and Wayne Fields, prepared for the Dry Creek Conservancy.

5. 2002 Stream Habitat Assessment for Placer County by ECORP Consulting, Inc.: ECORP completed a habitat assessment on approximately 5.2 miles of Secret Ravine between July 25th and October 26th 2002, beginning at the confluence with Miners Ravine and working upstream. They recorded habitat types as either pool, run, or riffle. A list of variables recorded is presented in Table 7. No analysis is presented and all I have available is the electronic data files with some preliminary summary information. **Source: Unpublished Habitat Assessment Data Files Collected by ECORP Consulting and forwarded by Barbara Washburn, California Environmental Protection Agency.**

Table 7. Summary of habitat parameters collected by ECORP during their 2002 habitat assessment of Secret Ravine.

Parameters Recorded	Parameters Recorded	Parameters Recorded
Date Sampled	Left Mid-Channel Depth	Percent Canopy Cover
Habitat Unit Number	Center Channel Depth	Area of Canopy Cover
Habitat Type	Right Mid-Channel Depth	Percent Instream Cover
Length of Habitat Unit (ft.)	Maximum Depth	Area of Instream Cover
Mean Channel Width (ft.)	Percentage Substrate Composition (9 categories)	Type of Instream Cover [Presence/Absence (9 categories)]
Flood Prone Width	Mean Depth	

Source: Unpublished Habitat Assessment Data Files Collected by ECORP Consulting and forwarded by Barbara Washburn, California Environmental Protection Agency.

6. 2003 Placer County Stream Videography Project: On March 12, 2003 Secret Ravine was videotaped by air. While the footage is informative, the amount of riparian canopy limits the effectiveness of this source, particularly given the detailed information contained in the 1999 habitat assessment by Stacy Li and Wayne Fields for the Dry Creek Conservancy and the 2002 partial habitat assessment by ECORP Consulting, Inc. **Source: Placer County Stream Videography Project.**

E. Fishery Resource Data

1. Documented Fish Species Present in the Stream

Fall-run chinook salmon (native)
Fall-run chinook salmon (introduced)
Steelhead/rainbow trout
Bluegill
Green sunfish
Brown bullhead
Common carp
Fathead minnow
Black bullhead
Pacific lamprey
Largemouth bass
Sacramento sucker
Sacramento pikeminnow (formerly known as Sacramento squawfish)
Spotted bass
Smallmouth bass
Redear sunfish
Warmouth
White crappie
White catfish
Roach
Goldfish
Hitch
Hardhead
Golden shiner

Source: California Department of Fish and Game, Region 2 files; DEIR Northeast Roseville Specific Plan, City of Roseville, October 1986; Placer County Flood Control and Water Conservation District, FPEIR Dry Creek Water Flood Control Program, October 1994; November 5, 2001 and February 5, 2003 Memoranda from CDFG Biologist Rob Titus, CDFG, Region 2 files; May 25, 1965 Memorandum from CDFG Biologist Eric Gerstung, CDFG, Region 2 files; June 3, 1965 Memorandum, by Eric Gerstung, entitled "THE FISH AND WILDLIFE RESOURCES OF THE SECRET RAVINE CREEK AREA OF PLACER COUNTY AND RECOMMENDATION FOR THEIR PROTECTION"; CDFG, Region 2 files.

2. Fish Stocking Records

Only five records (Table 5) of fish stocking were found in Department of Fish and Game files.
Source: CDFG, Region 2 files; CDFG, Region 2 files.

Table 5. Summary of fish stocking records for Secret Ravine.

Species	Origin	Date	Size (No./lb)	Mean Length*	Number Stocked	Location
Spring chinook salmon	Feather R. FH	2/20/85				None given
Fall-run chinook salmon	Feather R. FH	1/31/86	480	48	24,000	Loomis Basin Park
Fall-run chinook salmon	Feather R. FH	1/27/87	800	41	100,000	Loomis Basin Park
Fall-run	Feather R. FH	1/12/89	1,072	37	100,678	Sierra College Blvd.

chinook salmon						
Fall-run chinook salmon	Coleman/Nimbus	1/31/91	1,000	38	28,000	Sierra College
Fall-run chinook	Nimbus FH	3/2/93	1,230	36	51,660	Sierra College Blvd.

Source: CDFG, Region 2 files; CDFG, Region 2 files.

3. Adult Spawning Timing, Distribution, and Population Estimates

- **1963 Fall-run Chinook Salmon Spawning Survey by Eric Gerstung:** Gerstung conducted a salmon spawning survey in the fall of 1963. He described the physical habitat conditions (outlined above) and also observed that salmon spawned upstream to Rock Springs Road in Penryn (approximately 8 miles total distance). He indicated that spawning occurs in November in December, with juveniles emigrating to the ocean in April and May. He notes that steelhead spend 1-2 years in the stream. He estimated the 1963 fall-run size at 300 fish. **Source: June 3, 1965 Memorandum, by Eric Gerstung, entitled "THE FISH AND WILDLIFE RESOURCES OF THE SECRET RAVINE CREEK AREA OF PLACER COUNTY AND RECOMMENDATION FOR THEIR PROTECTION"; CDFG, Region 2 files; CDFG, Region 2 files.**

- **1964 Fall-run Chinook Salmon Spawning Survey by Eric Gerstung:** Gerstung conducted a survey of 2,500 ft. of stream (800 ft. at Rocklin Road Bridge, 900 ft. at Himes Road Bridge [Sierra College Blvd.] and 800 ft. at Taylor Road) on 11/23/64. Figure 10 shows the sections surveyed. He reported 38 carcasses and 4 live fish at Rocklin Road, 11 carcasses and 6 live fish at Himes [Sierra College Blvd.], and 13 carcasses and 4 live fish at Taylor Road. He estimated the run size to be 600+ fish and indicated that the run size was much larger than 1963 (estimated at 300 fish). Water clarity was reported as murky and flow estimated at 15 cfs. **Source: May 25, 1965 memorandum in CDFG, Region 2 files.**

- **1966 Fall-run Chinook Salmon Spawning Survey by Dan Gralian: Gralian** conducted a fall-run chinook salmon spawning survey on December 11, 1966. He counted fish in six locations (Table 6). His report states: "On a salmon count on Secret Ravine, between Penryn Rode [Road] and the Saw Mill, I saw only 4 "creamers" [carcasses] and one live salmon." [This location is obscure because the only sawmill along Secret Ravine is near Dominguez Road in Rocklin. However, the sequence of the observations (apparently) suggests that the "Saw Mill" location was near the confluence with Miners Ravine or downstream on Dry Creek mainstem. The other confounding factor is that one location is recorded as "Taylor Road" which I interpret to mean where Taylor Road comes near the confluence of Secret and Miners ravines.] The report continues: "The creek was covered with blackberry bushes along both sides of the bank so it was very difficult to see the stream. For this reason I very likely missed a great majority of the salmon. I talked to many of the residents along the creek and they said the salmon had not really come up yet. They said that for some reason the salmon were

late and they had seen very few." **Source: Handwritten memorandum dated 12/11/66 by Dan Gralian; CDFG Region 2 files.**

Figure 10. Location of 1964 salmon spawning surveys conducted by Eric Gerstung. This figure shows that he found fish spawning in Secret Ravine.

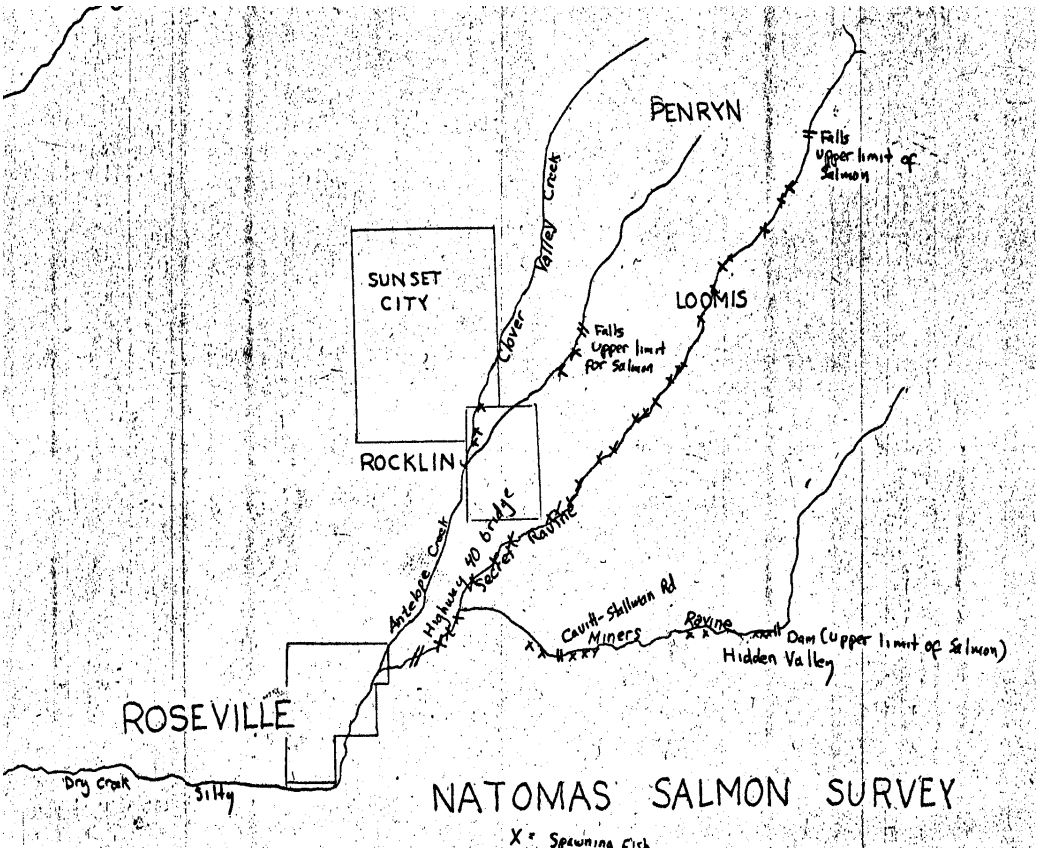


Table 6. Summary of fall-run chinook salmon spawning surveys completed on Secret Ravine on 12/11/1966.

Location	Distance Surveyed Upstream	Distance Surveyed Downstream	Results
Penryn Rd.	0.75 miles	To King Road	1 creamer downstream
Loomis Rd. [Horseshoe Bar]	To King Road	0.5 miles	1 creamer upstream; 1 live downstream
Himes Rd. [Sierra College Blvd.]	0.5 miles	0.5 miles	1 creamer downstream
Rocklin Rd.	0.5 miles	0.5 miles	No salmon; good spawning beds downstream
Taylor Rd.	0.75 miles	0.25 miles	No salmon
Saw Mill	0.25 miles	0.5 miles	1 creamer downstream

Source: Handwritten memorandum dated 12/11/66 by Dan Gralian; CDFG Region 2 files.

- **11/8/1968 Warden's Report:** A warden's report [for Friday, November 8] included observation of 107 salmon in Secret Ravine. [The warden's report did not indicate a year, but specified November 8th and Friday. I checked with the warden captain from CDFG Region 2 and he indicated that the form used in the report was from the mid-1960's to 1970's. A check of the universal calendar indicated that the only Friday November 8th during the period when the form was used occurred in 1968. I have thus assumed 1968 for this report.] **Source: Copy of Warden's Report in CDFG; Region 2 files.**

- **11/26/68 Fall-run Chinook Salmon Spawning Survey from Rocklin Road upstream to Brace Road:** This survey reported the following results:

    1. Rocklin Rd. to Sierra College Blvd. – 2 live fish; 1 carcass
    2. 100 yards upstream of Sierra College Blvd. – 1 live fish; 3 carcasses
    3. 2 live fish spawning 100 yards downstream of Brace Rd.
    4. One live fish below Brace Rd.; in the top 1/3 of the section.

    Flow was estimated at 8 cfs and 30-40% of the stream length was no accessible because of the berry vines.
    Source: Memorandum in CDFG; Region 2 files.

- **11/29/68 Fall-run Chinook Salmon Spawning Survey from Brace Road upstream to Rock Springs Road:** This survey reported the following results:

    5. Rock Springs Rd. downstream to ponds – 1 live fish; 1 carcass
    6. Rock Springs Rd. upstream 0.5 miles – 1 live fish; [two kids reported seeing 5 fish during the run]
    7. Penryn Rd. upstream 200 yards - 2 live fish [resident report seeing 9 fish during the run].

    Source: Memorandum in CDFG; Region 2 files.

- **December 6, 1985 Spawning Survey:** Secret Ravine was surveyed for fall-run chinook salmon on 12/6/85. The stream was surveyed from the confluence with Miners Ravine to approximately 0.5 miles upstream. No live fish or redds were seen, but two female carcasses (59 and 78 cm) and two male carcasses (91 and 99 cm) were seen and measured. Two skeletons were also seen. Flow was estimated at 20 cfs and visibility was 1-2 ft. **Source: 12/19/85 Memorandum from CDFG Biologist Phil Hanson, CDFG; Region 2 files.**

- **Mid-December 1991 CDFG Warden Report:** Warden reported 4 adult chinook salmon in Secret Ravine "just above Roseville". **Source: Unsigned, unidentifiable author note in CDFG, Region 2 files.**

- **1992-1993 Habitat Inventory by David Vanicek, Professor at California State University, Sacramento:** Vanicek reports conducting surveys along Secret Ravine in December 1992 and January 1993. One live fish was seen on December 3 in a pool about 50 meters above the [Roseville] Parkway Bridge. Two carcasses were observed on

December 3 about 300-400 meters above the Parkway Bridge and one carcass was observed on January 4 about 100 meters above the Parkway Bridge. Vanicek also reports a personal communication (December 10) with John Edgar, former Placer County Fish and Game Commissioner who reported that he had observed no adult salmon this year [1992], but that he had seen 72 in the watershed last year, mostly in Secret Ravine. **Source: Fisheries Habitat Evaluation Dry Creek, Antelope Creek, Secret Ravine, and Miners Ravine (Task I); Prepared for EIP Associates by C. David Vanicek, CSUS Hornet Foundation, August 1993, Copy from CDFG files, Region 2.**

- **1997 Spawning Gravel Survey by John Nelson, Department of Fish and Game:** Nelson surveyed the stream from the confluence with Secret Ravine to approximately 1.5 miles upstream in 1997. In this memorandum Nelson notes that the historical spawning run size in the Dry Creek Watershed is more than 1,000 fish with more than 60% occurring in Secret Ravine and more than 10% of the run occurring in Miners Ravine. **Source: 9/27/97 Memorandum from John Nelson, CDFG, Region 2 files.**

- **Summary of Dry Creek Conservancy Fall-run Chinook Salmon Surveys in Secret Ravine:** Dry Creek Conservancy members have been conducting foot surveys during the fall and early winter since 1997. Five reaches are described:

    1. Secret Ravine 1 (SR1): Secret Ravine from confluence with Miners Ravine to Roseville Parkway Bridge (approximately 1,400 ft.).
    2. Secret Ravine 2 (SR2): Secret Ravine from Roseville Parkway Bridge to:
       1997: Sandbar island below Sutter Hospital (approximately ½ mile).
       1998: Old diversion abutments (approximately ¾ mile.)
       1999-2000: South end of China Garden Road (approximately 1 mile)
    3. Secret Ravine 3 (SR3): Secret Ravine from China Garden Road to Rocklin Road.
    4. Secret Ravine 4 (SR4): Secret Ravine from Rocklin Road to Sierra College footbridge (approximately 5,000 ft.).
    5. Secret Ravine 5 (SR5): Secret Ravine in Loomis Basin Park

    Surveys usually begin about November 1 and continue until late December. Surveys are conducted periodically (varying periods) on five reaches (not all reaches are necessarily surveyed on the same day or within the same week, varying from year to year). Figures 11-16 displays the number of live fish and carcasses counted in all reaches combined for a single date (theoretically these totals could reflect from one to five reaches). In order to more fully assess spawning run timing and geographic distribution, a reach-by-reach analysis and evaluation is needed. Surveys have not been systematic or comprehensive and therefore, make assessing actual population numbers impossible. **Source: Dry Creek Conservancy; unpublished data; Placer County Flood Control and Water Conservation District and Sacramento County Water Agency, Final Report: Dry Creek Watershed Flood Control Plan, April 1992, Table 5-1, some reach lengths only.**

Figure 11. 1997 fall-run chinook salmon spawning surveys in Secret Ravine.

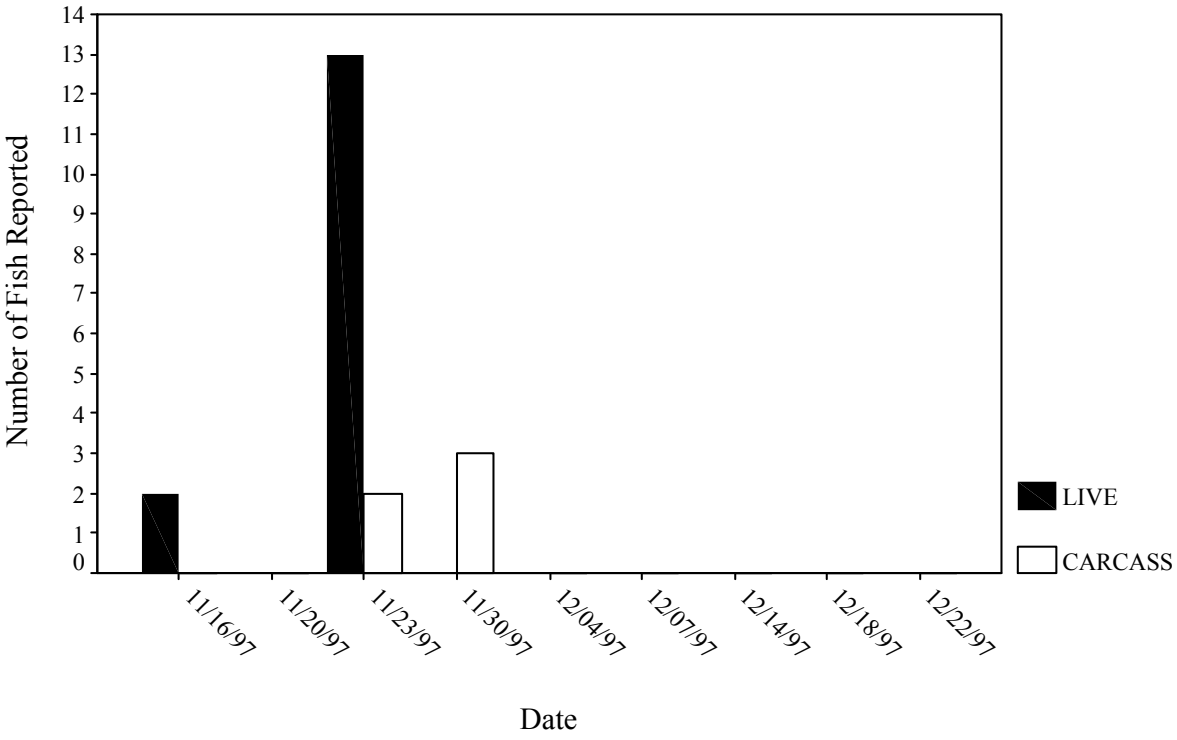


Figure 12. 1998 fall-run chinook salmon spawning surveys in Secret Ravine.

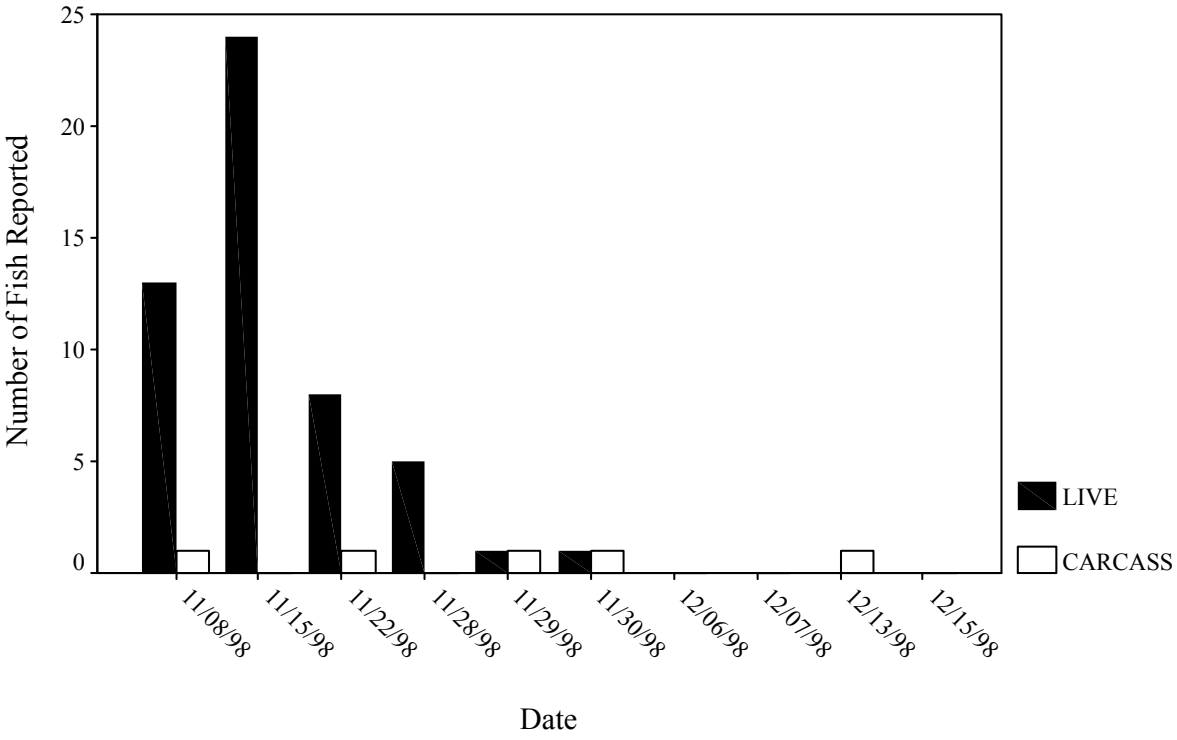


Figure 13. 1999 fall-run chinook salmon spawning surveys in Secret Ravine.

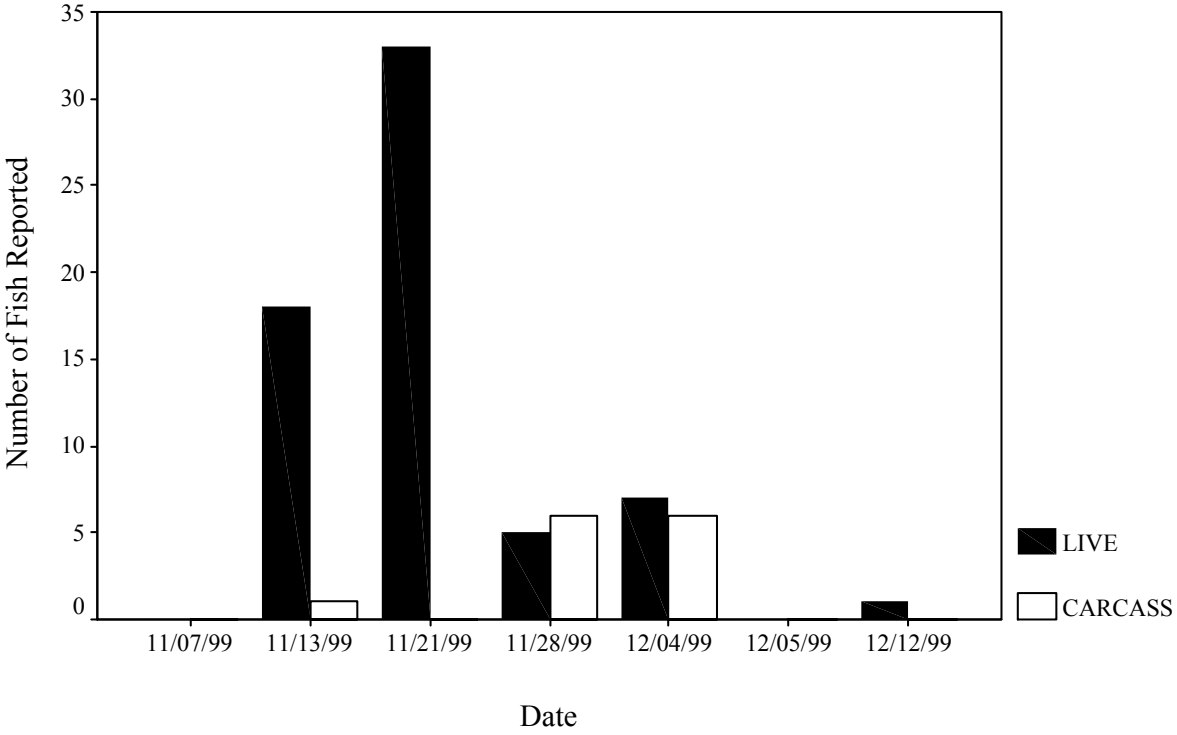


Figure 14. 2000 fall-run chinook salmon spawning surveys in Secret Ravine.

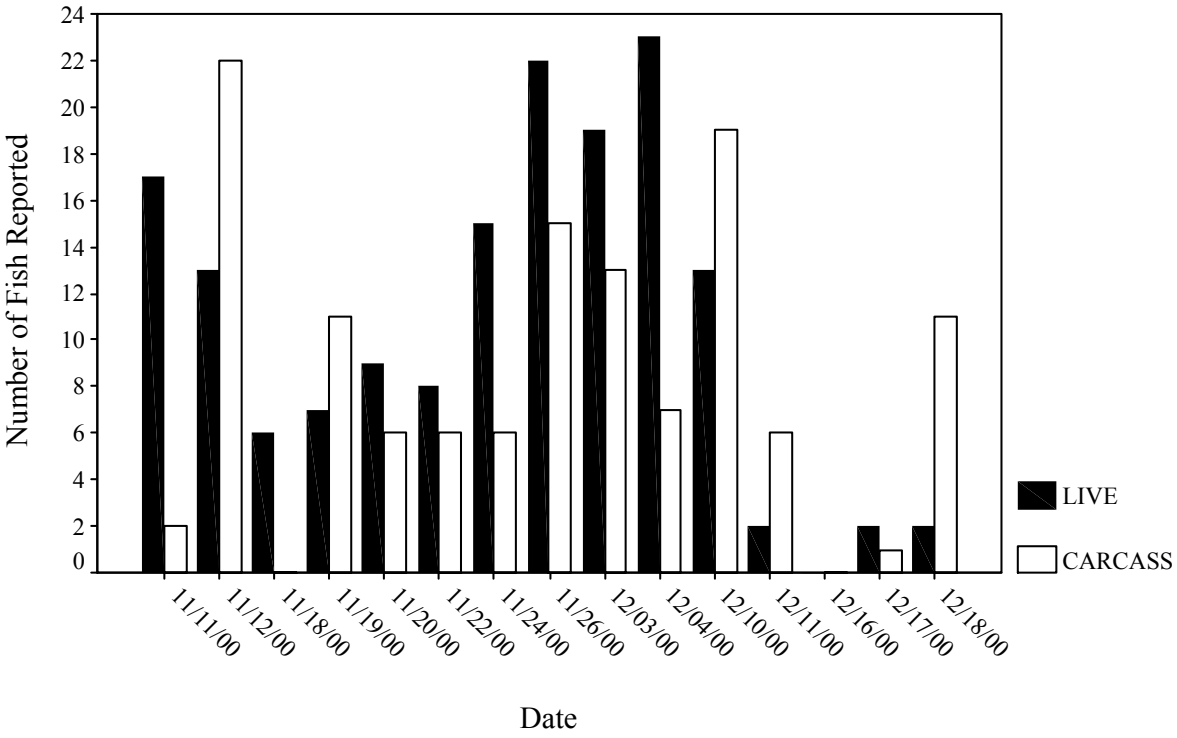


Figure 15. 2001 fall-run chinook salmon spawning surveys in Secret Ravine.

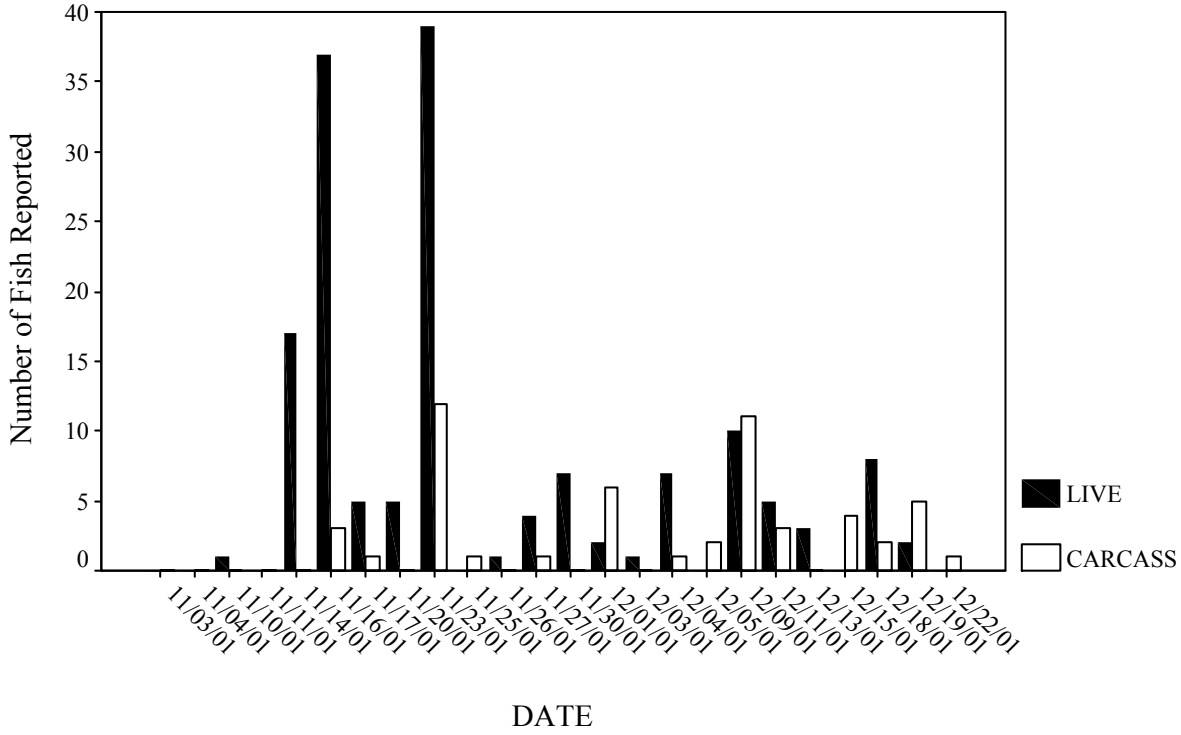
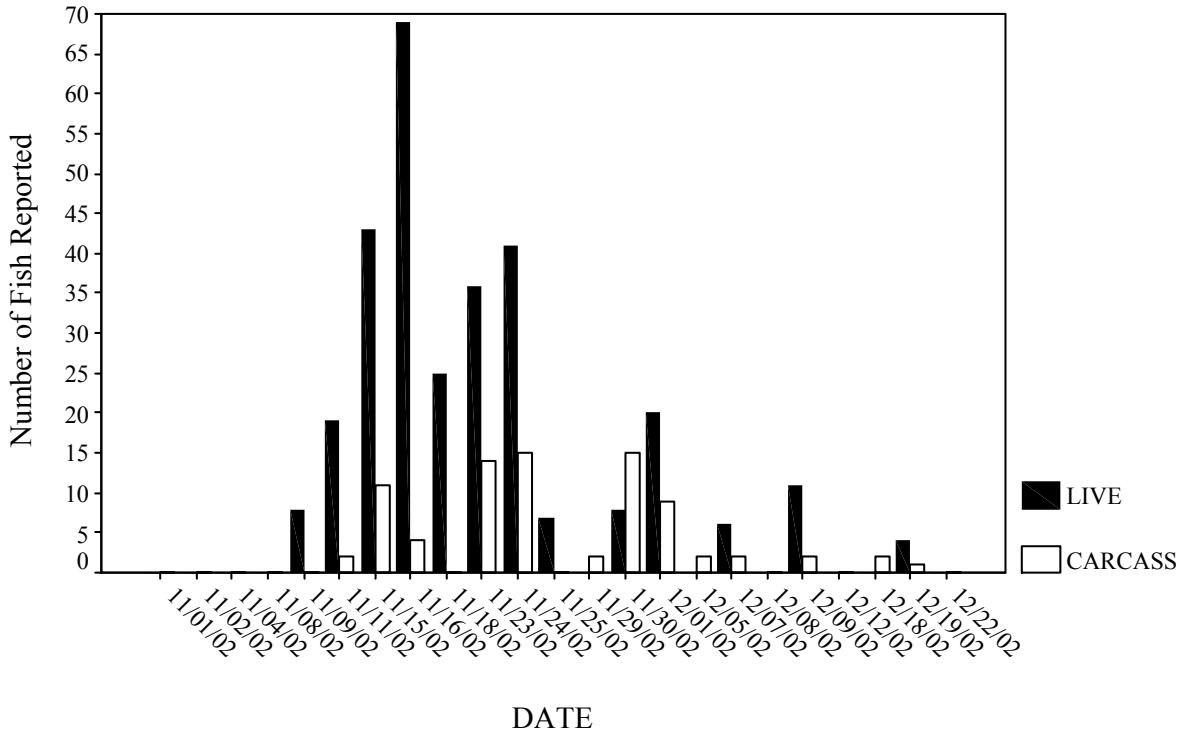


Figure 16. 2002 fall-run chinook salmon spawning surveys in Secret Ravine.



4. Juvenile Distribution and Sampling Data

- **Spring 1965 Fall-run Chinook Salmon Juvenile Emigration Survey by Eric Gerstung:** Gerstung began trapping for downstream migrant fall-run chinook juveniles in Secret Ravine at a site about 50 yards upstream of Sierra College Blvd. [cited in the original memorandum as "Himes Bridge", referring to the bridge on Himes Rd., which connected Taylor Rd. and Rocklin Rd. prior to the construction and renaming to Sierra College Blvd.] on February 16, 1965 and continued through March 4, 1965. Sampling was with a "riffle" trap or perforated plate trap. The trap fished a total of 352 ¾ hours and captured 1,338 juvenile chinook salmon alive, with 187 dead recorded. Gerstung noted: "thousands of salmon fry observed in Secret Ravine during April". Catch composition is noted as: crayfish, bullhead, green sunfish, hitch, rainbow trout, lamprey, and squawfish. Water temperatures were reported as ranging from 45-53 ^{O}F during this time period. **Source: May 25, 1965 memorandum in CDFG, Region 2 files; handwritten draft of May 25, 1965 memo, and other handwritten notes.**

- **August 8, 1966 One-time Electrofishing Event:** CDFG staff conducted a one-time electrofishing survey at Penryn [I assume Penryn Road crossing] on 8/8/66. Sampling occurred over a 100-foot reach of stream with catch consisting of ammocetes (juvenile lamprey) and three steelhead juveniles (4.3", 3.9", and 3.3"). **Source: Memorandum in CDFG, Region 2 files.**

- **August 2, 1967 One-time Electrofishing Event:** CDFG staff conducted a one-time electrofishing survey below "Rustic Hills" [a subdivision near the west end of China Garden Road in Rocklin] on August 2, 1967. Catch is reported as three rainbow trout (2.3", 2.4", and 3.0") and 14 "roughfish" [historically consisting of non-game native and non-native species]. Water flow was estimated as 8 cfs, water temperature was 74 ^{O}F, stream width was 25 ft., pool area was estimated as 4, 725 sq. ft., riffle area as 400 sq. ft., 205 ft. of stream length electrofished, pool depth 1-2 ft., and no spawning gravel noted. **Source: Memorandum in CDFG, Region 2 files; copy of data survey form.**

- **March 30, 1972 One-time Electrofishing Event:** CDFG staff conducted a one-time electrofishing survey "west of I-80" on March 30, 1972. A 100-foot section was sampled with catch reported as two rainbow trout adults, one rainbow trout fingerling (juvenile), and 8 chinook salmon fingerlings (juveniles). Water flow was estimated as "high". **Source: Memorandum in CDFG, Region 2 files.**

- **April 5, 1983 Seining Efforts at Brace Road and Rocklin Road:** CDFG staff conducted a one-time seining effort at two locations on Secret Ravine, with no estimate of area or distance of stream channel sampled. Catch and conditions are reported as:

    1. Brace Road – 2 squawfish fry, 2 lamprey, and 1 sucker fry; water temperature was 54 ^{O}F at 1030 hours.
    2. Rocklin Road – 12 chinook salmon juveniles (50, 50, 52, 59, 60, 61, 62, 68, 69, 69, 73, and 78 mm); water temperature was 54 ^{O}F at 1110 hours. **Source: Memorandum in CDFG, Region 2 files.**

- **1984 Seining and Electrofishing for Native Brood Year 1983 Fall-run Chinook Salmon:** Water temperatures for this sampling effort are reported above. Fish sampling results are presented in Table 7. **Source: Unsigned, unidentifiable author note in CDFG, Region 2 files.**

Table 7. Sampling results of a juvenile chinook salmon seining and electrofishing at two locations in Secret Ravine during the spring of 1984.

Date	Effort	No. Chinook	Length Mode (mm)	Length Range (mm)	Other Fish Species	Location
2/29/84	2 seine hauls	5	40	39-43	2- hardhead	Rocklin Rd.
2/29/84	2 seine hauls	7	38	37-38	2- squawfish*	Brace Rd.
3/6/84	1 seine haul	1		78	1- catfish, 1- squawfish	Rocklin Rd
4/2/84	1 seine haul	31	69	41-73	---	Rocklin Rd
4/2/84	1 seine haul	8	37	37-48	1- squawfish	Brace Rd.
4/10/84	2 seine hauls + 100 ft. Electrofish.	23	---	---	---	Rocklin Rd
4/10/84	Electrofish. No length	5	---	---	---	Brace Rd
5/2/84	2 seine hauls	34	73, 77, 78	55-86	2- rainbow trout; 34- squawfish	Rocklin Rd
5/2/84	1 seine haul	2	---	52-88	1- rainbow trout; 1- squawfish	Brace Rd
5/24/84	2 seine hauls	2	78	78	4- squawfish; 8 sucker fry	Rocklin Rd

***** Sacramento squawfish are now known as Sacramento pikeminnow.
Source: Unsigned, unidentifiable author note in CDFG, Region 2 files.

- **March 1988 One-time Electrofishing Event:** Jones and Stokes Associates conducted a one-time electrofishing event at an unknown location on Secret Ravine. They sampled a 300-meter reach were electrofished for a total of 1 hour. Flows were characterized as "high". Catch composition is presented in Table 8. **Source: FEIR Dry Creek Watershed Flood Control Plan, October 1994, Table 6-2.**

Table 8. Catch composition from a one-time sampling effort on Secret Ravine during March 1988.

Species	Size Range (mm)	Number Captured
Sacramento pikeminnow (formerly squawfish)	70-370	8
Bluegill	110-145	5
Sacramento sucker	85-450	4
Largemouth bass	80-120	3
Green sunfish	120-190	2
Brown bullhead	120	1

Source: FEIR Dry Creek Watershed Flood Control Plan, October 1994, Table 6-2.

- **1998-2000 Sampling in Secret Ravine by Rob Titus, California Department of Fish and Game:** Titus' sampling consisted of electrofishing to determine distribution of rearing juvenile chinook salmon and steelhead and rotary screw trapping [trap located just downstream of the confluence with Miners Ravine] to determine emigration timing. Sections of Secret Ravine, from the confluence with Miners Ravine upstream to Gilardi Road, near Penryn, were electrofished between November 5, 1998 and June 8, 1999. The rotary screw trap was placed about 100 m downstream of the confluence with Secret Ravine and fished from November 6, 1998 through June 2, 1999 and from January 9, 2000 though June 8, 2000.

  Electrofishing captured juvenile steelhead from Brace Road upstream to Gilardi Road crossing and at four intermediate sites (Loomis Basin Park, L.D.S. Recreation Park upstream from Penryn Road crossing, and at one site on each of two forks of the upper creek accessed from Rock Springs Road. Juvenile steelhead were captured (n=58) and ranged in length from 21 to 310 mm FL and averaged 117 mm. These data indicate the presence of young-of-the-year steelhead as well as rearing yearling and older steelhead. Juvenile steelhead were not captured in the sampling sections between the confluence with Miners Ravine and Sierra College Blvd. No sampling occurred between Sierra College Blvd. and Brace Road. Juvenile chinook salmon were captured in each of the sampling sites downstream from Sierra College Blvd. Captures in the rotary screw trap included three steelhead smolts (177-212 mm FL) between March 14th and April 7, 1999 and 10 smolts (160-238 mm FL) from March 3, 2000 through April 28, 2000. Chinook salmon juvenile catches totaled 4,588 in 1999 and 401 in 2000.

  Titus, in the February 5, 2003 memorandum (Tables 9, 10, and 11), provides more detailed information regarding his sampling efforts. Notice juvenile steelhead were not found in the fall of 1998 or 2000 at Loomis Basin Park (Table 11), but were found in the Park during the spring of 1999 (Table 10). **Source: Memoranda from CDFG Biologist Rob Titus dated November 5, 2001 and February 5, 2003, CDFG, Region 2 files.**

  Table 9. Temporal distribution of chinook salmon and steelhead catches in the rotary screw trap.

Month	1999 Chinook Salmon Catch	1999 Steelhead Catch	2000 Chinook Salmon Catch	2000 Steelhead Catch
January	0	0	5	0
February	658	0	103	0
March	1038	1	52	8
April	1375	2	57	2
May	1513	0	184	0
June	4	0	0	0
Total	4588	3	401	10

Table 10. Spatial and temporal distribution (+ = present; - = absent) of juvenile chinook salmon and steelhead in Secret Ravine during spring 1999 at various sampling locations.

Location	Sampling Date	Chinook	Steelhead
Upstream at mouth of stream	3/30/99	+	--
Downstream of East Roseville Parkway crossing	3/31/99	+	--
Upstream of East Roseville Parkway crossing	3/31/99	+	--
Behind Sierra College	4/1/99	+	--
Brace Road crossing	4/1/99	+	+
Brace Road crossing	5/7/99	+	+
Brace Road crossing	6/8/99	--	+
Horseshoe Bar Road crossing	5/5/99	--	+
Loomis Basin Park south, reach 1	4/2/99	--	+
Loomis Basin Park south, reach 2	4/2/99	--	+
Loomis Basin Park north at King Road	4/27/99	--	+
L.D.S. Recreation Park off Penryn Road	4/29/99	--	+
China Mine Road crossing	5/4/99	--	+
Buckeye Road off Penryn-Rock Springs Road	4/27/99	--	+
Upstream of Gilardi Road crossing	4/28/99	--	+

Table 11. Spatial and temporal distribution (+ = present; - = absent) of juvenile chinook salmon and steelhead in Secret Ravine during fall 1998 and 2000 at various sampling locations.

Location	Sampling Date	Chinook	Steelhead
Upstream of East Roseville Parkway crossing	10/28/00	--	--
Loomis Basin Park south, reach 1	11/5/98	--	--
Loomis Basin Park south, reach 2	11/5/98	--	--
L.D.S. Recreation Park off Penryn Road	11/5/98	--	+
Upstream of Gilardi Road crossing, reach 1	10/28/00	--	+
Upstream of Gilardi Road crossing, reach 2	10/28/00	--	+

Source: Memoranda from CDFG Biologist Rob Titus dated November 5, 2001 and February 5, 2003, CDFG, Region 2 files.

F. Fish Passage or Screening Data

No formal assessment of fish passage or screening issues has been completed for Secret Ravine. However, several investigators have suggested potential problems could prevent or hinder adult anadromous fish migration into and throughout Secret Ravine. These potential problems include:

- In Eric Gerstung's memorandum documenting his 1964 salmon spawning survey, he notes a waterfall in the upper watershed that limits salmon passage (see Figure 10 in this report above) but provided no information about the configuration of the falls and whether or not it was a complete barrier or only under certain conditions. It is impossible to determine the exact location of the falls, based on the scale and precision of Figure 5. This potential barrier may not even still exist, but confirmation of the continued presence

and potential influence on anadromous fish migration rate and access to suitable habitats is needed.

- Near the mouth of Secret Ravine is an old pipeline crossing consisting of concrete abutments, an old wood surfaced bridge, and a concrete sill across the stream channel. This sill could be a complete barrier or impede passage during certain low flow conditions. This problem is well documented and it is scheduled for remediation in the next several years.

- Low flows during the spawning migration, particularly for fall-run chinook salmon, have been identified as a potential passage problem. The concern is well documented in the Dry Creek Conservancy's *Secret Ravine Adaptive Management Plan: A Placer County Tributary of the Dry Creek Watershed*. Flows in Secret Ravine and Miners Ravine are controlled by water management practices of PG&E and Placer County Water Agency. Any changes in their water management practices, water deliveries, or initiatives to increase water use efficiency (e.g., lining canals with impervious surfaces) could have significant impacts on the suitability of streams in western Placer County to support anadromous fish populations.

As with other streams in western Placer County, the presence of beaver populations and their resulting dams always pose a potential problem for migrating adult salmonids. Although beaver dams are not generally identified as a major problem on Secret Ravine, Wayne Fields, who helped complete the Stacy Li led habitat assessment of Secret Ravine in September of 1999, has indicated that they saw several smaller beaver dams during their survey, but that they also saw at least one major dam that Fields believes would have been a total barrier to fish passage. Again, management of beaver populations and beaver dams to facilitate fish passage on an annual basis is needed.

APPENDIX SECRET RAVINE 1

BENTHIC MACROINVERTEBRATE DATA
COLLECTED BY THE DRY CREEK CITIZENS GROUP

and

BENTHIC MACROINVERTEBRATE DATA
COLLECTED BY
Wayne C. Fields, Hydrozoology, 1999

Secret Ravine Benthic Macroinvertebrate Samples 2000																			
												Secret Ravine				Secret Ravine Gravel Site			
								SAMPLING STATION:				2000				2000			
								REPLICATE #	TV	FFG	45	46	47	Total	57			Total
PHYLUM ARTHROPODA																			
		Class Insecta																	
			Coleoptera (Larvae)																
				Elmidae					4	c									
								Dubiraphia sp.	6	c									
								Microcylloepus sp.	4	c									
			Diptera																
				Ceratopogonidae					6	p									
								Bezzia sp./ Palpomyia sp.	6	p									
								Dasyhelea sp. (pupa)	6	nf									
				Chironomidae					6										
					Chironominae														
						Chironomini			6	c					4				
						Pseudochironomini			5	c									
						Tanytarsini			6	c	83	113	43	239	14				
					Orthocladiinae				5	c	19	9	20	48	27				
					Tanypodinae				7	p									
				Empididae					6	p									
								Clinocera sp.	6	p									
								Hemerodromia sp.	6	p		1		1	1				
								Neoplasta sp.	6	p		1	1	2					
				Muscidae					6	p					1				
								Limnophora sp.	6	p									
				Simuliidae					6	f									
								Simulium sp.	6	f	2	77	142	221	37				
				Tipulidae					3										
								Limonia sp.	6	s									
			Hemiptera																
				Corixidae					8	p									
								Sigara sp.	8	p									
			Megaloptera																
				Sialidae					4	p									
								Sialis sp.	4	p									
			Odonata																
				Calopterygidae					5	p									
								Hetaerina sp.	6	p		1		1					
				Coenagrionidae						p									
								Argia sp.	7	p	2	3		5	8				
				Gomphidae					4	p									
								Ophiogomphus occidentis.	4	p	2		1	3	9				

					Libellulidae					9	p								
									Brechmorhoga mendax	9	p	2	1		3	13			
				Lepidoptera															
					Nepticulidae						s			1	1				
					Pyralidae					5									
									Petrophila sp.	5	g	2	1		3	1			
				Ephemeroptera															
					Baetidae					4	g								
									Baetis sp.	5	c	15	30	21	66	39			
									Camelobaetidius sp.	4	c								
									Fallceon quilleri	4	c	2	2	1	5	3			
					Caenidae					7	c								
									Caenis sp.	7	c								
					Ephemerellidae					1	c								
									Eurylophella lodi	1	c								
					Leptohyphidae					4	c								
									Tricorythodes minutus	4	c	3	1	1	5	57			
				Plecoptera															
					Chloroperlidae					1	p	1			1	2			
					Perlodidae					2	p								
									Isoperla sp.	2	p								
				Trichoptera															
					Glossosomatidae					0	g								
									Protoptila coloma	1	g					9			
					Helicopsychidae					3	g								
									Helicopsyche borealis	3	g					1			
					Hydropsychidae					4	f								
									Hydropsyche californica	4	f	3	18	21	42	18			
					Hydroptilidae					4	g								
									Hydroptila sp.	6	g								
									Leucotrichia pictipes	6	g	2			2				
									Ochrotrichia sp.	4	c								
									Oxyethira sp.	3	c			1	1				
					Lepidostomatidae					1	s								
									Lepidostoma sp.	1	s								
					Leptoceridae					4	c								
									Mystacides alafimbriata	4	c								
									Nectopsyche gracilis	3	c								
									Triaenodes/Ylodes sp.	6	s								
					Philopotamidae					3	f								
									Chimarra sp.	4	f								
									Wormaldia sp.	3	f		1		1				
Subphylum Chelicerata																			
	Class Arachnoidea																		

Acari																			
	Hygrobatidae							8	p										
		Hygrobates sp.						8	p			1	1						
		Megapella sp.						8	p										
	Lebertiidae							8	p										
		Lebertia sp.						8	p	6			6						
	Sperchontidae							8	p										
		Sperchon sp.						8	p	8	4	5	17	5					
	Torrenticolidae							5	p										
		Torrenticola sp.						5	p										
Subphylum Crustacea																			
Class Malacostraca																			
Amphipoda																			
	Cragonyctidae							4	c										
		Crangonyx sp.						4	c	2	1	3	6	3					
		Stygobromus sp.						4	c		2		2						
	Hyalellidae							8	c										
		Hyalella sp.						8	c		1		1						
Decapoda																			
	Astacidae							8	c										
		Pacifasticus lenisculus						6	c										
Class Ostracoda																			
Ostracoda								8	c										
	Cyprididae							8	c										
PHYLUM COELENTERATA																			
Class Hydrozoa																			
Hydroida																			
	Hyridae																		
		Hydra sp.						5	p										
PHYLUM MOLLUSCA																			
Class Gastropoda																			
Pulmonata																			
	Ancylidae							6	g										
		Ferrissia sp.						6	g	5	5	2	12	2					
	Lymnaeidae							6	g										
		Fossaria sp.						8	g										
	Physidae							8	g										
		Physa sp./ Physella sp.						8	g					2					
	Planorbidae							6	g										
		Gyraulus sp.						8	g										
		Helisoma sp.						6	g										
		Micromenetus sp.						6	g		1		1						
Class Bivalvia																			
Pelecypoda								8	f										
	Corbiculidae							10	f										

								Corbicula fluminea	10	f	23	2		25	12			
					Sphaeriidae				8	f								
								Pisidium sp.	8	f					1			
PHYLUM NEMATODA									5	p	2	2	1	5	1			
PHYLUM PLATYHELMINTHES																		
		Class Turbellaria																
				Tricladida														
					Planariidae				4	p								
								Dugesia tigrina	4	p	3			3	8			
PHYLUM ANNELIDA																		
		Class Oligochaeta							5	c	18	24	25	67	22			
				Megadrili					5	c								
PHYLUM NEMERTEA																		
		Class Enopla																
					Tertastemmatidae													
								Prostoma graecense	8	p	42	4	5	51	17			
								Total			247	305	295	847	317	0	0	0
								Taxa Richness			22	24	18	32	27	0	0	0
								Percent Dominant Taxon			34	37	48	28	18	#DIV/0!	#DIV/0!	#DIV/0!
								EPT Taxa			6	5	5	8	7	0	0	0
								EPT Index (%)			10.5	17.0	15.3	14.5	40.7	#DIV/0!	#DIV/0!	#DIV/0!
								Sensitive EPT Index			0.4	0.3	0.3	0.4	3.8	#DIV/0!	#DIV/0!	#DIV/0!
								Ephemeroptera Taxa			3.0	3.0	3.0	3.0	3.0	0.0	0.0	0.0
								Plecoptera Taxa			1.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0
								Trichoptera Taxa			2.0	2.0	2.0	4.0	3.0	0.0	0.0	0.0
								Dipteran Taxa			3.0	5.0	4.0	5.0	6.0	0.0	0.0	0.0
								Percent Dipteran			42.1	65.9	69.8	60.3	26.5	#DIV/0!	#DIV/0!	#DIV/0!
								Non-Insect Taxa			9.0	10.0	7.0	13.0	10.0	0.0	0.0	0.0
								Percent Non-Insect			44.1	15.1	14.2	23.3	23.0	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Chironomidae			41.3	40.0	21.4	33.9	14.2	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Hydropsychidae			1.2	5.9	7.1	5.0	5.7	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Baetidae			6.9	10.5	7.5	8.4	13.2	#DIV/0!	#DIV/0!	#DIV/0!
								Shannon Diversity			2.3	2.0	1.8	2.2	2.7	0.0	0.0	0.0
								Tolerance Value			6.5	5.7	5.6	5.9	5.4	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Intolerant (0-2)			0.4	0.0	0.0	0.1	3.5	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Tolerant (8-10)			32.8	3.9	3.7	12.3	15.8	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Collectors			57.5	60.0	39.0	51.9	53.3	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Filterers			11.3	32.1	55.3	34.1	21.5	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Grazers			3.6	2.3	0.7	2.1	4.7	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Predators			27.5	5.6	4.7	11.7	20.5	#DIV/0!	#DIV/0!	#DIV/0!
								Percent Shredders			0.0	0.0	0.3	0.1	0.0	#DIV/0!	#DIV/0!	#DIV/0!
								Total Percentages			100.0	100.0	100.0	100.0	100.0	#DIV/0!	#DIV/0!	#DIV/0!
								Total Abundance			247	563	787		317			

Secret Ravine Benthic Macroinvertebrate CSBP Summary Metrics, 2000			
	Secret Ravine		
	2000		
	Mean	CV	Total
Taxa Richness	21.3	14.3	32.0
Percent Dominant Taxon	39.6	19.2	28.2
EPT Taxa	5.3	10.8	8.0
EPT Index (%)	14.3	23.6	14.5
Sensitive EPT Index	0.4	11.6	0.4
Ephemeroptera Taxa	3.0	0.0	3.0
Plecoptera Taxa	0.3	173.2	1.0
Trichoptera Taxa	2.0	0.0	4.0
Dipteran Taxa	4.0	25.0	5.0
Percent Dipteran	59.3	25.3	60.3
Non-Insect Taxa	8.7	17.6	13.0
Percent Non-Insect	24.5	69.5	23.3
Percent Chironomidae	34.2	32.6	33.9
Percent Hydropsychidae	4.7	65.7	5.0
Percent Baetidae	8.3	23.4	8.4
Shannon Diversity	2.0	12.3	2.2
Tolerance Value	5.9	7.9	5.9
Percent Intolerant (0-2)	0.1	173.2	0.1
Percent Tolerant (8-10)	13.5	124.0	12.3
Percent Collectors	52.2	22.0	51.9
Percent Filterers	32.9	66.8	34.1
Percent Grazers	2.2	67.3	2.1
Percent Predators	12.6	102.4	11.7
Percent Shredders	0.1	173.2	0.1

Secret Ravine Benthic Macroinvertebrate Samples 2001																			
												Secret Ravine @ Miner's Ravine				Secret Ravine @ Sierra College			
								SAMPLING STATION:			2001				2001			
								REPLICATE #	TV	FFG	58	59	60	Total	70	71	72	Total
PHYLUM ARTHROPODA																			
			Class Insecta																
				Coleoptera (Larvae)															
					Elmidae				4	c									
								Dubiraphia sp.	6	c					1			1
								Microcylloepus sp.	4	c	3			3				
				Diptera															
					Ceratopogonidae				6	p									
								Bezzia sp./ Palpomyia sp.	6	p									
								Dasyhelea sp. (pupa)	6	nf									
					Chironomidae				6										
						Chironominae													
							Chironomini		6	c									
							Pseudochironomini		5	c									
							Tanytarsini		6	c	55	97	106	258	69	18	32	119
						Orthocladiinae			5	c	43	16	7	66	23	11	26	60
						Tanypodinae			7	p	1			1	2	1	1	4
					Empididae				6	p									
								Clinocera sp.	6	p						1		1
								Hemerodromia sp.	6	p								
								Neoplasta sp.	6	p								
					Muscidae				6	p									
								Limnophora sp.	6	p								
					Simuliidae				6	f									
								Simulium sp.	6	f	28	14	49	91	19	149	39	207
					Tipulidae				3									
								Limonia sp.	6	s			1	1				
				Hemiptera															
					Corixidae				8	p									
								Sigara sp.	8	p									
				Megaloptera															
					Sialidae				4	p									
								Sialis sp.	4	p									
				Odonata															
					Calopterygidae				5	p									
								Hetaerina sp.	6	p						1		1
					Coenagrionidae					p									
								Argia sp.	7	p	9	17	5	31	5	3	4	12
					Gomphidae				4	p									

								Ophiogomphus occidentis.	4	p	3	1	4	8			3	3
					Libellulidae				9	p								
								Brechmorhoga mendax	9	p		2	2	4	3	6	6	15
				Lepidoptera														
					Nepticulidae					s								
					Pyralidae				5									
								Petrophila sp.	5	g		5	3	8			2	2
				Ephemeroptera														
					Baetidae				4	g								
								Baetis sp.	5	c	7	6	1	14	15	14	25	54
								Camelobaetidius sp.	4	c								
								Fallceon quilleri	4	c		1		1	4	1	1	6
					Caenidae				7	c								
								Caenis sp.	7	c								
					Ephemerellidae				1	c								
								Eurylophella lodi	1	c								
					Leptohyphidae				4	c								
								Tricorythodes minutus	4	c			1	1	4	1	2	7
				Plecoptera														
					Chloroperlidae				1	p								
					Perlodidae				2	p								
								Isoperla sp.	2	p						1	1	2
				Trichoptera														
					Glossosomatidae				0	g								
								Protoptila coloma	1	g					1			1
					Helicopsychidae				3	g								
								Helicopsyche borealis	3	g							1	1
					Hydropsychidae				4	f								
								Hydropsyche californica	4	f	14	11	8	33	9	15	17	41
					Hydroptilidae				4	g								
								Hydroptila sp.	6	g					2			2
								Leucotrichia pictipes	6	g	1			1			6	6
								Ochrotrichia sp.	4	c					4		3	7
								Oxyethira sp.	3	c		2		2	1			1
					Lepidostomatidae				1	s								
								Lepidostoma sp.	1	s								
					Leptoceridae				4	c								
								Mystacides alafimbriata	4	c					1			1
								Nectopsyche gracilis	3	c	1			1			2	2
								Triaenodes/Ylodes sp.	6	s								
					Philopotamidae				3	f								
								Chimarra sp.	4	f			1	1	5	25	24	54
								Wormaldia sp.	3	f						1		1
Subphylum Chelicerata																		

Class Arachnoidea															
Acari															
Hygrobatidae							8	p							
Hygrobates sp.							8	p							
Megapella sp.							8	p							
Lebertiidae							8	p							
Lebertia sp.							8	p	3	3		6			
Sperchontidae							8	p							
Sperchon sp.							8	p	6	4	1	11	9		3	12
Torrenticolidae							5	p							
Torrenticola sp.							5	p							
Subphylum Crustacea															
Class Malacostraca															
Amphipoda															
Cragonyctidae							4	c							
Crangonyx sp.							4	c	3	2	9	14	4	2		6
Stygobromus sp.							4	c							
Hyalellidae							8	c							
Hyalella sp.							8	c					6			6
Decapoda															
Astacidae							8	c							
Pacifasticus lenisculus							6	c							
Class Ostracoda															
Ostracoda							8	c							
Cyprididae							8	c							
PHYLUM COELENTERATA															
Class Hydrozoa															
Hydroida															
Hyridae															
Hydra sp.							5	p			1	1			
PHYLUM MOLLUSCA															
Class Gastropoda															
Pulmonata															
Ancylidae							6	g							
Ferrissia sp.							6	g	7	11	19	37	2			2
Lymnaeidae							6	g							
Fossaria sp.							8	g							
Physidae							8	g							
Physa sp./ Physella sp.							8	g					1		2	3
Planorbidae							6	g							
Gyraulus sp.							8	g							
Helisoma sp.							6	g							
Micromenetus sp.							6	g	10	6	5	21	11	1	2	14
Class Bivalvia															
Pelecypoda							8	f							

				Corbiculidae					10	f							
								Corbicula fluminea	10	f	5	15	21	41	11	1	24	36
				Sphaeriidae					8	f								
								Pisidium sp.	8	f	1			1	5			5
PHYLUM NEMATODA									5	p	2	6	9	17	10	6	17	33
PHYLUM PLATYHELMINTHES																		
		Class Turbellaria																
				Tricladida														
				Planariidae					4	p								
								Dugesia tigrina	4	p	3	8	2	13	17	13	14	44
PHYLUM ANNELIDA																		
		Class Oligochaeta							5	c	54	90	56	200	47	25	15	87
				Megadrili					5	c								
PHYLUM NEMERTEA																		
		Class Enopla																
				Tertastemmatidae														
								Prostoma graecense	8	p	32	18	8	58	18	5	9	32
								Total			291	335	319	945	309	301	281	891
								Taxa Richness			22	21	22	30	29	22	26	38
								Percent Dominant Taxon			19	29	33	27	22	50	14	23
								EPT Taxa			4	4	4	8	10	7	10	15
								EPT Index (%)			7.9	6.0	3.4	5.7	14.9	19.3	29.2	20.9
								Sensitive EPT Index			0.3	0.6	0.0	0.3	0.6	0.7	1.4	0.9
								Ephemeroptera Taxa			1.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0
								Plecoptera Taxa			0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0
								Trichoptera Taxa			3.0	2.0	2.0	5.0	7.0	3.0	6.0	11.0
								Dipteran Taxa			4.0	3.0	4.0	5.0	4.0	5.0	4.0	5.0
								Percent Dipteran			43.6	37.9	51.1	44.1	36.6	59.8	34.9	43.9
								Non-Insect Taxa			11.0	10.0	10.0	12.0	12.0	7.0	8.0	12.0
								Percent Non-Insect			43.3	48.7	41.1	44.4	45.6	17.6	30.6	31.4
								Percent Chironomidae			34.0	33.7	35.4	34.4	30.4	10.0	21.0	20.5
								Percent Hydropsychidae			4.8	3.3	2.5	3.5	2.9	5.0	6.0	4.6
								Percent Baetidae			2.4	2.1	0.3	1.6	6.1	5.0	9.3	6.7
								Shannon Diversity			2.4	2.3	2.2	2.4	2.8	2.0	2.8	2.7
								Tolerance Value			5.8	5.9	6.0	5.9	5.8	5.5	5.7	5.7
								Percent Intolerant (0-2)			0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.3
								Percent Tolerant (8-10)			16.2	12.5	10.0	12.8	17.2	4.0	15.7	12.2
								Percent Collectors			57.0	63.9	56.4	59.3	57.9	23.9	37.7	40.1
								Percent Filterers			16.5	11.9	24.8	17.7	15.9	63.5	37.0	38.6
								Percent Grazers			6.2	6.6	8.5	7.1	5.5	0.3	4.6	3.5
								Percent Predators			20.3	17.6	10.0	15.9	20.7	12.3	20.6	17.8
								Percent Shredders			0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0
								Total Percentages			100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
								Total Abundance			499	335	696		1059	1806	1124	

Secret Ravine Benthic Macroinvertebrate CSBP Summary Metrics, 2001						
	Secret Ravine @ Miner's Ravine			Secret Ravine @ Sierra College		
	2001			2001		
	Mean	CV	Total	Mean	CV	Total
Taxa Richness	21.7	2.7	30.0	25.7	13.7	38.0
Percent Dominant Taxon	27.0	27.2	27.3	28.6	65.1	23.2
EPT Taxa	4.0	0.0	8.0	9.0	19.2	15.0
EPT Index (%)	5.8	38.7	5.7	21.1	34.7	20.9
Sensitive EPT Index	0.3	95.6	0.3	0.9	48.6	0.9
Ephemeroptera Taxa	1.7	34.6	3.0	3.0	0.0	3.0
Plecoptera Taxa	0.0	#DIV/0!	0.0	0.7	86.6	1.0
Trichoptera Taxa	2.3	24.7	5.0	5.3	39.0	11.0
Dipteran Taxa	3.7	15.7	5.0	4.3	13.3	5.0
Percent Dipteran	44.2	15.0	44.1	43.7	31.8	43.9
Non-Insect Taxa	10.3	5.6	12.0	9.0	29.4	12.0
Percent Non-Insect	44.3	8.8	44.4	31.3	44.8	31.4
Percent Chironomidae	34.4	2.6	34.4	20.5	50.0	20.5
Percent Hydropsychidae	3.5	33.2	3.5	4.6	34.3	4.6
Percent Baetidae	1.6	70.4	1.6	6.8	32.5	6.7
Shannon Diversity	2.3	5.6	2.4	2.5	18.6	2.7
Tolerance Value	5.9	1.0	5.9	5.7	2.4	5.7
Percent Intolerant (0-2)	0.0	#DIV/0!	0.0	0.3	5.0	0.3
Percent Tolerant (8-10)	12.9	23.8	12.8	12.3	58.8	12.2
Percent Collectors	59.1	7.0	59.3	39.9	42.9	40.1
Percent Filterers	17.7	36.7	17.7	38.8	61.5	38.6
Percent Grazers	7.1	17.3	7.1	3.5	79.3	3.5
Percent Predators	16.0	33.3	15.9	17.9	27.1	17.8
Percent Shredders	0.1	173.2	0.1	0.0	#DIV/0!	0.0

Wayne C. Fields -- Secret Ravine Baseline Macroinvertebrate Samples, September 1999

TAXON			HABITAT UNIT AND NUMBER COLLECTED											
			3	5	93	97	251	253	318	322	492	505	618	629
Phylum Platyhelminthes														
Family Planariidae	/*Dugesia tigrina*	1	16	19	23	37	2	1	17	7	3	2		
P. Nemertea														
F. Tetrastemmatidae	/*Prostoma graecense*		1	4	13	9	12	12	1		20	1	19	23
P. Nematoda														
F. Mermithidae	/unidentified species A		1	1	1							3	1	3
	/uid species B			1	1								1	
P. Annelida														
Class Oligochaeta														
Order Tubificida														
F. Naididae	/*Nais alpina*			1				3	42	42	1	6	40	28
	/*N. communis/variabili*	*s*	12	3	3	1	3							
	/*N. pardalis*		15	7	3		2		5	5	2			
	/*Slavina appendiculata*		86	112	4		11	10		1	1	1	1	9
F. Tubificidae	/*Aulodrilus pigueti*		1											
	/*Bothrioneurum vejdovskyanum*			1					2					
	/*Limnodrilus hoffmeisteri*											4		
F. Enchytraeidae	/uid species A								1					
	/uid species B								2					
F. Megascolecidae	/uid species	4	5	4	2	28	23	1	6	18	5	2	2	
O. Lumbriculida														
F. Lumbriculidae	/*Lumbriculus variegatus*											1		
P. Arthropoda														
Cl. Crustacea														
F. Crangonyctidae	/*Synurella* sp.	4	2							2	1	6	2	
Cl. Insecta														
O. Ephemeroptera														
F. Baetidae	/*Baetis tricaudatus*	47	105	14	20	58	18	42	73	31	49	40	51	

Secret Ravine Baseline Macroinvertebrate Samples, September 1999

TAXON		HABITAT UNIT AND NUMBER COLLECTED											
		3	5	93	97	251	253	318	322	492	505	618	629
F. Baetidae	/*Fallceon quilleri*	1	1	16	3	5	3	1		6	2	1	1
	/*Procloeon* sp.											3	
F. Heptageniidae	/*Heptagenia* sp.					1			2	1	2		
F. Tricorythidae	/*Tricorythodes minutus*	1	2	62	5	9	8	20	62	44	27	66	39
O. Odonata													
F. Gomphidae	/*Ophiogomphus occidentis* 1	1	8	7	8	5	3	5	14	8	3		
F. Libellulidae	/*Brechmorhoga mendax*		4	6	6	20	30	6	13	31	57	15	10
F. Calopterygidae	/*Hetaerina americana*			1								1	
F. Coenagrionidae	/*Argia vivida* 2	2	24	3	9	5	5	12	6	8	6	46	
O. Plecoptera													
F. Nemouridae	/*Malenka* sp.												1
O. Trichoptera													
F. Glossosomatidae	/*Glossosoma* sp.	1		1	1	1	1		2				
	/*Protoptila coloma* 3	5	21	71	79	94	4	3	47	75	55	1	
F. Helicopsychidae	/*Helicopsyche borealis*			2	6	21							
F. Hydropsychidae	/*Hydropsyche californica*	6	16	17	34	6	3	7	10	45	11	23	16
F. Hydroptilidae	/*Hydroptila* sp.	11	2	1									
	/*Leucotrichia pictipes*		1					2	2	1	5		
	/*Ochrotrichia* sp.						3	1			1	1	
F. Leptoceridae	/*Nectopsyche gracilis*			5	3			1	1			1	
F. Philopotamidae	/*Chimarra* sp.				11	6	26	11	2				
	/*Wormaldia* sp.	1			2	2	2			3			12
O. Lepidoptera													
F. Pyralidae	/*Parapoynx* sp.								1				
	/*Petrophila* sp.	4	3					1					

Secret Ravine Baseline Macroinvertebrate Samples, September, 1999

TAXON		HABITAT UNIT AND NUMBER COLLECTED											
		3	5	93	97	251	253	318	322	492	505	618	629
O. Coleoptera													
F. Elmidae	/*Cleptelmis* sp.						1						
	/*Dubiraphia* sp.		1										
O. Diptera													
F. Ceratopogonidae	/*Atrichopogon* sp.					1							
F. Chironomidae	/*Pentaneura* sp. 1												
	/*Micropsectra* sp. A										1		4
	/*Micropsectra* sp. B	8	3	3		1			3		1		
	/*Paratanytarsus* sp.						1				1		
	/*Rheotanytarsus* sp.	69	20	24	1	3	2	2	7	6	4	2	8
	/*Polypedilum* sp. A5						1	3				3	
	/*Polypedilum* sp. B							1	1				
	/*Robackia demeijerei*						2				2		
	/*Stenochironomus* sp.							1	2				
	/*Pagastia* sp.					1		1					
	/*Brillia* sp.								2				1
	/*Cardiocladius* sp. 1												
	/*Corynoneura* sp.	1			1		1	2	1				
	/*Cricotopus bicinctus*		1	2	1				1				
	/*Eukiefferiella* sp. 1												
	/*Orthocladius dentifer*	2		5	2		1						2
	/*Parametriocnemus* sp.						2	2					
	/*Rheocricotopus* sp.	1					1		2	1			2
	/*Thienemanniella* sp.	3	3				1	1			1	1	1
F. Psychodidae	/*Maruina* sp.	7						1					
F. Simuliidae	/*Simulium argus*	11	7	1		7	1	32	12	1	1		9
	/*S. aureum*	1	1			1		9	22	5	2	2	13
F. Tipulidae	/*Dicranota* sp.										1		
	/*Tipula* sp.												
F. Empididae	/*Hemerodromia* sp.				3			2	5		1	3	2

Secret Ravine Baseline Macroinvertebrate Samples, September, 1999

TAXON			HABITAT UNIT AND NUMBER COLLECTED											
			3	5	93	97	251	253	318	322	492	505	618	629
Cl. Arachnida														
O. Hydracarina														
F. Lebertiidae	/*Lebertia* sp.				1	1								
F. Sperchontidae	/*Sperchon* sp.	4	1	5	1	3	5	4	2	7	1	1	5	
F. unknown	/uid mite species A	1												
P. Mollusca														
Cl. Gastropoda														
F. Planorbidae	/*Micromenetus dilatatus*	1	2	1										
F. Physidae	/*Physa gyrina*				1	2				1	1			
F. Ancylidae	/*Ferrissia rivularis*	1	1	4		2	5				1	1	1	
Cl. Bivalvia														
F. Sphaeriidae	/*Pisidium casertanum*					1								
F. Corbiculidae	/*Corbicula fluminea*		2	1	35	15	1			1	2	2	3	2
TOTAL SPECIES:	73		32	31	31	25	26	25	34	33	27	30	27	33
TOTAL ORGANISMS:	3543		308	319	314	217	314	300	235	320	317	289	305	305
PERCENT SIMILARITY:			83.3		47.6		89.7		84.7		80.2		69.8	